Northwest Science

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Corvallis, Oregon 97331

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Northwest Science

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1. Meeting in Corvallis
2. a) Number attendance papers.
b) Change of officers.
c) Change of fees.
2. Next meeting

NORTHWEST SCIENTIFIC ASSOCIATION

54th Annual Meeting

Oregon State University
Corvallis, Oregon

March 26, 27 and 28, 1981

SYMPOSIA

Forest Succession in the Northwest

Evolutionary Biology

Mt. St. Helens

SECTION CONTRIBUTED PAPERS

Botany

Forestry

Geology/Geography

Science Education

Soil and Water

Zoology

Banquet Speaker: DR. CHARLES ROSENFELD

"Remote Sensing of the Volcanic Eruptions of Mt. St. Helens, WA"

6:30 PM, March 26, 1981, Memorial Union Ballroom

			UVic	UBC	MOF
B.C.	71	UVic ✓	4	6	1
	88	UVic ✓		4	
	(106	UBC ✓) Workpres.			
	117	UBC ✓			
	139	UBC ✓			
	157	UVic ✓			
	163	UVic ✓			
(9)	161	UBC ✓			
	169	UBC ✓			
(10)	172	MOF			

Total papers 181

Activities of UVic St. Helen captured the interest of scientists greatly. Not only ~~this~~ all the papers were directly or indirectly related to this topic but a one day symposium (19 papers), and the speaker for the banquet, also covered UVic St. Helens activities.

SCHEDULE OF EVENTS

Thursday, March 26, 1981

7:30 - 12:00	REGISTRATION	Milam Aud. Lobby
8:20 - 5:00	Symposium: Forest Succession in the Northwest	Milam Auditorium
12:00 - 1:00	Luncheon	Memorial Union Ballroom
1:30 - 5:00	Symposium: Evolutionary Biology	123 Milam
5:00	Evolutionary Biology Organizational Meeting	123 Milam
1:00 - 5:00	Forestry Section Contributed Papers	213 Milam
5:00	Forestry Section Business Mtg	213 Milam
1:20 - 4:40	Botany Section Contributed Papers	202 Milam
4:40	Botany Section Business Mtg	202 Milam
1:30 - 5:00	Soil & Water Section Contributed Papers	318 Milam
5:00	Soil & Water Section Business Mtg	318 Milam
1:30 - 4:00	Zoology Section Contributed Papers	234 Milam
1:30 - 3:45	Geology/Geography Contributed Papers	206 Milam
5:00	Pacific Northwest Volcano Floristics Projects Organizational Mtg	337 Milam
6:30	Banquet Program: "An Overview of the Mt. St. Helens Eruptions" - presented by Dr. Charles Rosenfeld, Oregon State University.	Memorial Union Ballroom

Friday, March 27, 1981

8:00 - 12:00	REGISTRATION	Milam Aud. Lobby
8:00 - 5:00	Symposium: Mt. St. Helens	Milam Auditorium
8:30 - 12:00	Symposium: Evolutionary Biology	123 Milam
8:30 - 12:00	Soil and Water Section Papers	318 Milam
8:20 - 5:00	Botany Section Papers	202 Milam
8:00 - 5:00	Forestry Section Papers (Two Concurrent Sessions)	206 Milam 213 Milam
1:30 - 3:35	Science Education Section Papers	247 Weniger
3:45 - 5:00	AETS (Northwest Region) Business Mtg	247 Weniger
12:00 - 1:00	Luncheon and NSA Business Mtg	

Saturday, March 28, 1981

8:00 - 5:30	Field Trip to H. J. Andrews National Ecological Research Area	Bus will leave from Gill Coliseum Parking Lot

Points of Interest: Hydrology & Erosion, Vegetation biomass and Successional research, Earth Flow site, Canopy research, Aquatic research, and Watershed study site.

SYMPOSIUM

FOREST SUCCESSION AND STAND DEVELOPMENT RESEARCH IN THE NORTHWEST

co-sponsored by

Northwest Scientific Association
Pacific Northwest Forest and Range Experiment Station
Oregon State University

Thursday, March 26, 1981
Milam Auditorium
Presiding: Jerry Franklin

(1) 8:20 PATTERNS OF DEVELOPMENT OF FOREST STANDS. D. M. Smith, Yale University.

(2) 8:45 STAND DEVELOPMENT--ITS USES AND METHODS OF STUDY. C. D. Oliver, University of Washington. Prof Silva Ecology

(3) 9:10 STAND DEVELOPMENT OF EVEN-AND MULTI-AGED STANDS OF GRAND FIR/DOUGLAS-FIR IN EASTERN WASHINGTON. Bruce C. Larson, University of Washington

(4) 9:35 COAST REDWOOD FOREST STAND DYNAMICS AND SUCCESSIONAL STATUS. S. C. Veirs, Jr., Redwood Nat'l Park, Arcata, CA.

10:00 COFFEE BREAK

(5) 10:20 DYNAMICS OF MOUNTAIN HEMLOCK STANDS INFECTED WITH Phellinus weirii. S. A. Cook, Univ. of Oregon.

(6) 10:45 DEVELOPMENTAL HISTORY OF DRY-SITE DOUGLAS-FIR IN THE CENTRAL WESTERN CASCADES OF OREGON. Joseph E. Means, PNW-FS, Corvallis, OR.

(7) 11:10 SUCCESSION IN THE MIXED FORESTS OF NORTHWESTERN CALIFORNIA. D. A. Thornburgh, Humboldt State Univ.

(8) 11:35 CLASSIFICATION OF FOREST SUCCESSION ON FOUR HABITAT TYPES IN WESTERN MONTANA. Stephen F. Arno, Intermountain F&RES, Missoula, Montana.

12:00 LUNCH

(9) 1:30 FOREST SUCCESSION MODELS AND THEIR ECOLOGICAL AND MANAGEMENT IMPLICATIONS. D.C. West. H.H. Shugart, T.M. Smith, Oak Ridge Nat'l Lab., Oak Ridge, Tenn.

(10) 1:55 MODELING FOREST SUCCESSION IN THE NORTHWEST. M. Hemstrom, V.D. Adams, Willamette Nat'l Forest, Univ. of Washington.

(11) 2:20 SIMULATION OF FOREST STANDS IN A HYPOTHETICAL WATERSHED USING MODELS AND CARTOGRAPHIC ANALYSIS. K.L. Reed, HDR - Sciences Division, Santa Barbara, CA.

(12) 2:45 REGENERATION MODELING AS A COMPONENT OF FOREST SUCCESSION SIMULATION. A.R. Stage, D.E. Ferguson, Intermountain F&RES, Moscow, Idaho.

3:10 COFFEE BREAK

(13) 3:30 DESIGNING SUCCESSION MODELS TO MEET MANAGEMENT NEEDS. Robert D. Pfister, Intermountain F&RES, Missoula, MT

(14) 3:44 UNDERSTORY DEVELOPMENT IN FOREST SUCCESSION: EXAMPLES FROM THE INLAND NORTHWEST. B. Zamora, Washington State University.

(15) 4:20 SUCCESSION ON TWO HABITAT TYPES IN WESTERN WASHINGTON. J. A. Henderson, Olympic Nat'l Forest, Olympia, WA.

(16) 4:45 FOREST SUCCESSION RESEARCH IN THE PACIFIC NORTHWEST: AN OVERVIEW. Jerry Franklin, PNW-FS, Corvallis, OR.

SYMPOSIUM

EVOLUTIONARY BIOLOGY

Thursday, March 26, 1981

123 Milam Hall

Presiding: Kareen Sturgeon, OSU

(17) 1:30 OFFSPRING SELECTION DURING FRUIT PRODUCTION. Susan Bookman, Washington State University.

(18) 1:50 EVOLUTIONARY DYNAMICS OF CROP DOMESTICATION: SOYBEAN AS AN EXAMPLE. S. L. Broich, Oregon State University

(19) 2:10 A COMPARISON OF INTERPOPULATION PHENOTYPIC DIFFERENTIATION IN TWO NORTHWESTERN PLETHODONTID SALAMANDERS. J.J. Beatty & H.G. Hanlin, Oregon State University.

(20) 2:30 SPECIATION AND BIOGEOGRAPHY OF THE WESTERN SPADEFOOT TOAD, Scaphiopus Hammond II. Herbert A. Brown, Western Washington University.

(21) 2:50 PATTERNS OF MORPHOLOGICAL VARIATION IN CASTILLEJA (SCROPHULARIACEAE). A.V. Anderson & R.J. Taylor, Western Washington University.

3:10 BREAK

(22) 3:40 ELECTROPHORESIS OF ISOENZYMES OF WESTERN SHRUBS. R.L. Leonard & E.D. McArthur, Brigham Young Univ.

(23) 4:00 ENZYME VARIATION OF DOUGLAS-FIR POPULATIONS IN ALBERTA. Bruce P. Dancik, University of Alberta

(24) 4:20 RELATIVE TIMING OF EMERGENCE: THE ROLE OF ROOT SYSTEMS IN INTERSPECIFIC COMPETITION. P.A. Bookman, Washington State University.

(25) 4:40 SPRUCE BUDWORM-DOUGLAS-FIR INTERACTIONS: VARIABILITY OF FOLIAGE QUALITY WITHIN AND AMONG HOST POPULATIONS. D. Perry & G. Pitman, Oregon State University.

5:00 EVOLUTIONARY BIOLOGY ORGANIZATIONAL MEETING

Friday, March 27, 1981

123 Milam Hall

Presiding: Kareen Sturgeon, OSU

(26) 8:30 CORRELATED CHANGES IN CANNIBALISTIC BEHAVIOR IN Tribolium castaneum AS A RESULT OF ARTIFICIAL SELECTION FOR DISPERSAL ABILITY. D.F. Zirkle, Oregon State University.

(27) 8:50 SENSITIVITY OF A COEVOLVED PLANT-POLLINATOR SYSTEM TO VARIATIONS IN LIFE-HISTORY TACTICS. V.D. Adams, University of Washington.

(28) 9:10 ECTOMYCORRHIZAL COLONIZATION OF WESTERN HEMLOCK SEEDLINGS IN DIFFERENT MICROSITES. E. J. Christy, Washington State University.

(29) 9:30 ADAPTIVE VARIATION IN RECOMBINATION FREQUENCY. P.S. Dawson, Oregon State University.

(30) 9:50 CANOPY ROOTS: CONVERGENT EVOLUTION IN TEMPERATE AND TROPICAL RAINFOREST NUTRIENT CYCLES. N.M. Nadkarni, University of Washington.

10:10 BREAK

(31) 10:40 R-SELECTION WITH GENES, AGE-STRUCTURE AND FLUCTUATIONS. S.D. Tuljapurkar, Portland State University.

(32) 11:00 PREY PREFERENCE AND THE RELATIONSHIP OF ALLOMETRIC GROWTH IN THE SKULL OF Thamnophis elegans vagrans. D.W. Jansen, Washington State University.

(33) 11:20 FLOWER AND FRUIT PRODUCTION IN A PERENNIAL LUPINE AND SEED DESTRUCTION BY CURCULIONID WEEVILS. T.A. Maurer, University of Oregon.

(34) 11:40 TANNINS AND GALL-WASPS. H.G. Larew, Oregon State University.

SYMPOSIUM

MT. ST. HELENS

Friday, March 27, 1981
Milam Auditorium

Presiding: R. J. Carson

(35) 7:30 P.M. REMOTE SENSING OF THE VOLCANIC ERUPTIONS OF MT. ST. HELENS, WA. C.L. Rosenfeld, Oregon State University.

(36) 8:00 A.M. INTRODUCTION AND 1880 SUMMIT DEFORMATION OF MT. ST. HELENS, WASHINGTON. R.J. Carson, Whitman College.

(37) 8:20 SCIENTIFIC INVESTIGATIONS OF MT. ST. HELENS ERUPTIONS BY THE U.S. GEOLOGICAL SURVEY. D. W. Peterson. U.S. Geological Survey.

(38) 8:40 SEISMICITY ASSOCIATED WITH THE ERUPTION OF MT. ST. HELENS. S. Malone, University of Washington.

(39) 9:00 ACOUSTIC EFFECTS OF THE MT. ST. HELENS ERUPTION. C.M. Fairfield, The Oregon Museum of Science & Industry.

(40) 9:20 THE HYDROLOGIC ASPECTS OF THE MAY 18, 1980 ERUPTION OF MT. ST. HELENS, WASHINGTON. P. J. Carpenter, U.S. Geological Survey, Tacoma, WA.

(41) 9:40 MT. ST. HELEN'S EFFECTS ON THE TIMBER RESOURCES OF THE GIFFORD PINCHOT NATIONAL FOREST. Tom Beckman, U.S. Forest Service.

(42) 10:00 RAPID PYROCLASTIC FLOWS ON THE SOUTH FLANK OF MOUNT ST. HELENS DURING THE ERUPTION OF MAY 18, 1980. Guy H. Rooth, Oregon College of Education.

10:20 BREAK

(43) 10:40 GAS EMISSIONS FROM MT. ST. HELENS. T. J. Casadevall, Geological Survey

(44) 11:00 TILT MEASUREMENTS ON THE SOUTH SIDE OF MT. ST. HELENS, Ansel Johnson, Portland State University.

(45) 11:20 ONE LEGACY OF MOUNT ST. HELENS - A HYDROLOGIC NIGHTMARE. P. J. Carpenter, U.S. Geological Survey.

(46) 11:40 THE DOWNWIND CHARACTERISTICS OF THE JULY 22, 1980 ERUPTION OF MOUNT ST. HELENS. R. Quinn, Eastern Washington University.

(47) 1:40 DESIGN AND CONSTRUCTION OF DEBRIS STRUCTURES ON TOUTLE RIVER, MT. ST. HELENS. D. E. Bankofier, U.S. Army Corps of Engineers

(48) 2:00 ASSESSMENT OF VOLCANIC HAZARDS AT MT. ST. HELENS. Chris Newhall, U.S. Geological Survey.

(49) 2:20 EFFECTS AND RESPONSES OF THE VEGETATION TO THE MT. ST. HELENS ERUPTION. A.B.Adams and Others, Univ. of Washington.

(50) 2:40 EFFECTS OF MT. ST. HELENS EMISSIONS ON LICHENS OF SOUTHWESTERN WASHINGTON. T.J. Moser, J. R. Swafford, T.H. Nash, Arizona State University.

(51) 3:00 PRIEST RAPIDS VEGETATION AND MT. ST. HELENS ASH. J.D. Mastrogiuseppe, S.J. Gill, Washington State Univ.

3:20 BREAK

(52) 3:40 SOME OBSERVATIONS ON THE LOWER SOUTH SLOPES OF MT. ST. HELENS AUGUST AND NOVEMBER 1980. C. M. Senger, Western Washington University.

(53) 4:00 EFFECTS OF MT. ST. HELENS TEPHRA ON FOREST UNDERSTORY PLANTS AS MODIFIED BY SNOWPACK. J. A. Antos, D. B. Zobel, Oregon State University.

(54) 4:20 VEGETATION RECOVERY ON MT. ST. HELENS: A PRELIMINARY REPORT. R. del Moral, University of Washington.

4:40 CONCLUSION. R.J. Carson, Whitman College.

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SYMPOSIUM

BOTANY SECTION

Session 1

Thursday, March 26, 1981

202 Milam Hall

Presiding: C. David McIntire, OSU

Aquatic Botany

(55) 1:20 GROWTH STUDIES OF THE RED ALGA Iridaea cordata (Turner) BORY. Debbie Opitz-Reiswig, Western Wash. University.

(56) 1:35 GROWTH, DYNAMICS OF A Zostera marina L. BED IN NETARTS BAY, OREGON. M.E. Kentula, C.D. McIntire, Oregon State University.

(57) 1:55 RELEASE OF SEDIMENT PHOSPHORUS BY Elodea canadensis. B.C. Moore, W.H. Funk, H.L. Gibbons, Washington State University.

(58) 2:10 EFFECT OF NUTRIENT ENRICHMENT ON BENTHIC DIATOMS IN YAQUINA BAY, OREGON. N.C. Cardon, Oregon State Univ.

(59) 2:25 BENTHIC PRIMARY PRODUCTION IN THE COLUMBIA RIVER ESTUARY. M.C. Amspoker, C.D.McIntire, Oregon State University.

(60) 2:40 EFFECTS OF INFAUNA ON BENTHIC MICROALGAL BIOMASS AND PRODUCTION IN AN OREGON ESTUARY. M.W. Davis, H. Lee, Oregon State University.

3:00 COFFEE BREAK

Cryptogamic Botany

(61) 3:20 THE ZONATION OF MOSSES AND LICHENS ON THE SALMON RIVER, IN IDAHO. R. Rosentreter, Univ. of Montana.

(62) 3:35 EPIPHYTE COMMUNITY VARIATION ON Quercus garryana DOUGL. IN MOUNT DOUGLAS PARK, VICTORIA, B.C. K.A. Plamer, J.D. Rogers, E.V.Dobyns, M.A.M. Bell, Univ. of Victoria.

(63) 3:50 PALEOPATHOGEN. K.B. Leslie, C.H.Driver, Univ. of Washington.

(64) 4:05 THE SARCOSCYPHACEAE OF WESTERN OREGON. W. Denison, Oregon State University.

(65) 4:20 DID HIGHER FUNGI EVOLVE FROM RED ALGAE: A REVIEW. W. Denison, Oregon State University.

4:40 BOTANY SECTION MEETING

Session 2

Friday, March 27, 1981

202 Milam Hall

Presiding: Donald B. Zobel, OSU

Terrestrial Community Ecology

(66) 8:20 FLORA OF WILD HORSE ISLAND, FLATHEAD LAKE, MONTANA. D. R. Kautz, University of Montana.

(67) 8:40 VEGETATION CLASSIFICATION AND EVALUATION: ELK ISLAND NATIONAL PARK, CANADA. D.F. Polster, L.E. Watson, Techman Engineering, Ltd.

(68) 9:00 PATTERNS OF VEGETATION AND SOIL DEVELOPMENT ON THE KAUTZ MUDFLOW, MOUNT RAINIER NATIONAL PARK, WASHINGTON. L.P. Rigney, M.E. Krasny, P.M. Frenzen, Univ. of WA.

(69) 9:20 BOTANICAL SURVEY OF CAPE FLATTERY AND OZETTE, OLYMPIC PENINSULA, WASHINGTON. S.J. Gill, Washington State University.

(70) 9:40 LONG TERM COMMUNITY STRUCTURAL CHANGES DURING SECONDARY SUCCESSION IN SOUTHEAST ALASKA. P. B. Alaback, Oregon State University.

10:00 COFFEE BREAK

(71) 10:20 A COMPARATIVE STUDY OF VEGETATION AND SOILS ON TWO ROCK FORMATIONS IN THE QUESNEL HIGHLANDS OF BRITISH COLUMBIA. S.W. Taylor, M.A.M.Bell, Univ. of Victoria.

(72) 10:35 ECOLOGICAL CHARACTERISTICS IDENTIFIED FROM ALGORITHM STRUCTURE. R.H. Sauer, M.L.Warner, W.T. Hinds, Battelle, Pacific Northwest Laboratories

(73) 10:50 HABITAT TYPE DIFFERENCES IN THE SEASONAL TREND OF FOLIAR NITROGEN CONCENTRATION. W.A. McKee, G.M. Hawk, J.B. Franklin, D.B. Zobel, Oregon State University.

(74) 11:10 RESEARCH NATURAL AREAS: A RESOURCE WHICH NEEDS TO BE USED. S.E. Greene, Oregon State University.

(75) 11:30 EFFECTS OF SPIDER MITE FEEDING INJURY ON HOST PLANT CARBOHYDRATES. J.D. DeAngelis, Oregon State Univ.

Session 3

Friday, March 27, 1981

202 Milam Hall

Presiding: Janet E.Hohn
U.S. Fish and Wildlife Service

Terrestrial Autecology

(76) 1:30 ENVIRONMENTAL REGULATION OF GROWTH AND DORMANCY IN Lewisia rediviva PURSH. (Portulacaceae). S.C. Marvel, University of Montana.

(77) 1:50 BLUEBUNCH WHEATGRASS PRODUCTIVITY: THE RELATIVE EFFECTS OF CLIPPING AND BURNING. M.C. McShane, Battelle, Pacific Northwest Laboratory.

(78) 2:05 RESPONSE OF JUNEGRASS TO JAPANESE BROME AND KOCHIA COMPETITION. J. T. Romo, University of Montana.

(79) 2:25 SEED GERMINATION IN Artemisia tridentata Wyomingensis NUTT. L.E. Eddleman, University of Montana.

(80) 2:45 GERMINATION PATTERNS OF TAMARACK, Larix laricina (DU ROI) K. KOCH. K.R. Brown, Oregon State Univ.

3:00 COFFEE BREAK

(81) 3:20 THE DETECTION OF MULTIPLE BURNS IN THE AGE STRUCTURE OF MATURE DOUGLAS-FIR STANDS. M.W. Klopsch, Oregon State University.

Systematics and Autecology of Rate Plants

(82) 3:40 AN ONGOING STUDY OF Iris tenax VAR. Gormanii IN THE NORTH COAST RANGE OF OREGON AND ONE SIMILAR LOCATION IN THE CASCADES. P. Beiley, L. Scofield, Bureau of Land Management.

(83) 3:55 THE BIOLOGY OF Lomatium bradshawii (APIACEAE), A RARE PLANT OF OREGON. J.S. Kagan, University of Oregon.

(84) 4:15 EFFECTS OF MOUNTAIN GOATS ON THREE PLANTS UNIQUE TO THE OLYMPIC MOUNTAINS, WASHINGTON. D.J. Pike, Univ. of Washington.

(85) 4:45 TOLMIEA X TELLIMA, AN INTERGENERIC HYBRID. D.H. Wagner, University of Oregon.

FORESTRY SECTION

Session 1

Thursday Afternoon, March 26, 1981

213 Milam Hall

Presiding: Tom Adams

(86) 1:00 THE INCIDENCE OF Fomes annosus IN PRECOMMERCIALLY THINNED AND UNTHINNED WESTERN HEMLOCK STANDS AT CLALLAM BAY, WASHINGTON. R.L. Edmonds, C.H.Driver, T. Jordon, University of Washington.

(87) 1:20 EFFECTS OF LAURICIDIN AND ETHYLENEDIAMINETETRAACETIC ACID (EDTA) ON GROWTH OF SEVERAL HYMENOMYCETOUS FUNGI. C.Y. Li, P.E. Aho, USDA-FS, Corvallis, OR.

(88) 1:40 PRELIMINARY STUDIES OF Sirococcus strobilinus DEVELOPMENT IN LODGEPOLE PINE. T.A. Suttill, J.W. Paden, University of Victoria.

(89) 2:00 PRELIMINARY HAZARD RATING SYSTEM FOR WESTERN PINE-SHOOT BORER IN CENTRAL IDAHO. A.S. Robertson, K.J. Stoszek, University of Idaho.

(90) 2:20 EFFECTS OF LARCH CASEBEARER DEFOLIATION ON GROWTH AND DEVELOPMENT OF JUVENILE MIXED-SPECIES LARCH STANDS. S.B. Laursen, J.A. Moore, Univ. of Idaho.

(91) 2:40 THE ROLE AND USE OF PRESCRIBED FIRE TO CONTROL THE SPREAD OF TANSY RAGWORT, Senecio jacobaea L. IN REDWOOD NATIONAL PARK, CALIFORNIA. R.J. Mastrogiuseppe, N.T. Blair, Redwood National Park, California.

3:00 COFFEE BREAK

(92) 3:20 EARLY POST-FIRE RECOVERY WITHIN NORTH-FACING RAVINE DOUGLAS-FIR FORESTS, WESTERN MONTANA. M.F. Crane, J.R. Habeck, University of Montana.

(93) 3:40 GRASS AND SEDGE PRODUCTION FOLLOWING PRESCRIBED FIRE. J.D. Landsberg, R.E. Martin, USDA-FS, Bend, Oregon.

(94) 4:00 THE SUITABILITY OF COMMERCIALLY AVAILABLE GRASSES FOR HIGH ELEVATION REVEGETATION. M.J. Behan, University of Montana.

(95) 4:20 ARTIFICIAL AND NATURAL CONTROL OF MEDUSAHEAD Elymus caput-medusae L. L.C. Goebel, M. Bouknafer, Washington State University.

(96) 4:40 PRELIMINARY STUDY OF PARTICLEBOARD MANUFACTURE USING Pinus oocarpa FROM HONDURAS. R. M-Guevara, S.A. Guillen, University of Idaho.

5:00 FORESTRY SECTION MEETING

Session 2A

Friday Morning, March 27, 1981

213 Milam Hall

Presiding: Dan Santantonio

(97) 8:00 ENVIRONMENTAL RELATIONSHIPS OF SELECTED FOREST HABITAT TYPES IN NORTHERN UTAH. P.M. Lawton, University of Idaho.

(98) 8:20 FOREST FLOORS ALONG AN ELEVATIONAL TRANSECT OF THE OREGON WESTERN CASCADES. C. Topik, Univ. of Oregon.

(99) 8:40 LITTERFALL MONITORING IN FORESTS OF THE PACIFIC NORTHWEST. W.T. Hinds, M.C. McShane, J.R. Skalski, Pacific Northwest Lab., Richland, WA.

(100) 9:00 DECOMPOSITION OF STUMPS AND LARGE WOODY ROOTS, WESTERN OREGON. S.P. Cline, P. Sollins, T. Verhoeven, Oregon State University.

(101) 9:20 THE ROLE OF DATA MANAGEMENT IN LONG TERM ECOLOGICAL STUDIES. P.B. Alaback, M. Klopsch, G. Koerper, Oregon State University.

(102) 9:40 ALLELOPATHIC EFFECTS OF SPRUCE BARK. R.J. Taylor, Western Washington University.

10:00 COFFEE BREAK

(102) 10:20 MODELING EARLY SUCCESSION FOLLOWING CLEARCUTTING AND BURNING. P.M. Lawton, University of Idaho.

(104) 10:40 ROLE OF NATURAL FIRE PERIODICITY IN SUCCESSION. R.E. Martin, USDA-FS, Bend, Oregon.

(105) 11:00 FUEL ACCUMULATION IN RELATION TO STAND HISTORY. C.D. Armour, L.F. Neuenschwander, University of Idaho.

(106) 11:20 A MICROSITE APPROACH TO ASSESSING LODGEPOLE PINE REGENERATION ON SCARIFIED CUTOVER IN THE B.C. INTERIOR. K.A. Vietnieks, University of British Columbia.

(107) 11:40 CONTROLLED BURNING: FOREST MANAGEMENT IN THE ABORIGINAL COLUMBIA PLATEAU. J.A. Ross, Eastern Wash. University.

Session 2B

Friday Morning, March 27, 1981

206 Milam Hall

Presiding: Bruce Dancik

(108) 8:00 EFFECTS OF NH_4^+ AND NO_3^- ON GROWTH OF A MYCORRHIZAL FUNGUS, Hebeloma crustuliniforme. W. Littke, R.L. Edmonds, C.S. Bledsoe, Univ. of Washington.

(109) 8:20 SEEDLING SURVIVAL OF OUTPLANTED MYCORRHIZAL DOUGLAS-FIR. C.S. Bledsoe, K. Tennyson, W. Lopushinsky, Univ. of Washington and USDA-FS, Wenatchee, Wash.

(110) 8:40 THE EFFECTS OF SEWAGE EFFLUENT ON ACER MYCORRHIZAE. P.C. Otto, J.R. Boyle, University of Washington.

(111) 9:00 NITROGEN FIXATION AND NET PRIMARY PRODUCTION IN A YOUNG SITKA ALDER ECOSYSTEM. Dan Binkely, Oregon State University.

(112) 9:20 SITKA ALDER AND DOUGLAS-FIR MIXTURES LOOK PROMISING. C.A. Harrington, R.L. Deal, USDA-FS, Olympia, WA.

(113) 9:40 NITROGEN ACCRETION AND AVAILABILITY IN SNOWBRUSH ECOSYSTEMS. Dan Binkely, K. Cromack, Jr., Oregon State University.

10:00 COFFEE BREAK

(114) 10:20 LARGE SCALE INOCULATIONS OF RED ALDER NURSERY STOCK WITH N-FIXING ACTINOMYCETES. N.G. Sugihara, Redwood National Park, California.

(115) 10:40 BIOMASS PRODUCTION AND NITROGEN ASSIMILATION CAPACITY OF Alnus rubra SEEDLINGS. P.A. Monaco, K.K. Ching, T.M. Ching, Oregon State University.

(116) 11:00 ADAPTABILITY OF EUCALYPTUS SPECIES IN SOUTHWEST OREGON. L.O. Hunt, Winston, Oregon. (#) → 1850 into US (Ore

(117) 11:20 GENETIC VARIATION OF ISOZYME AND QUANTITATIVE TRAITS IN A SELECTED DOUGLAS-FIR POPULATION. Y.S. El-KASSABY, O. Sziklai, University of British Columbia.

(118) 11:40 FACTORS AFFECTING THE CLONAL COMPOSITION OF CONE CROPS IN DOUGLAS-FIR SEED ORCHARDS. J. Mikola, Oregon State University. Assumptions of S.O

① All clones produce equal amounts of viable pollen

② Mating is random

③ Isolation from outside pollen.

(#) Eu. regnans
Eu. delicatissima
Eu. globulus

Session 3A

Friday Afternoon, March 27, 1981

213 Milam Hall

Presiding: Shep Zedaker

(119) 1:00 DOUGLAS-FIR TREES RESPOND WELL ON POOR-QUALITY SITE WHEN GIVEN AMPLE SPACE. C.A. Harrington, D.L. Reukema, USDA-FS, Olympia, Washington.

(120) 1:20 COMPARING STRIP THINNING AND CONVENTIONAL THINNING. D.D. McCreary, D.A. Perry, Oregon State University.

(121) 1:40 INFLUENCE OF THINNING ON SEED PRODUCTION IN A YOUNG DOUGLAS-FIR STAND. D.L. Reukema, USDA-FS, Olympia, WA.

(122) 2:00 RESPONSE OF INLAND GRAND FIR AND DOUGLAS-FIR STAND TYPES TO NITROGEN FERTILIZATION AND THINNING. D. Scanlin, J.R. Olson, University of Idaho.

(123) 2:20 DEVELOPMENT OF YOUNG WESTERN LARCH UNDER REGULATED STAND DENSITIES. W.C. Schmidt, USDA-FS, Bozeman, MT.

(124) 2:40 RESPONSE OF Taxus brevifolia NUTT. (PACIFIC YEW) FOLLOWING TIMBER HARVESTING. Rex Crawford, Univ. of Idaho.

3:00 COFFEE BREAK

(125) 3:20 PLANT COMMUNITY CHANGES AND STOCK TYPE PERFORMANCE FOLLOWING BRUSHFIELD CONVERSION IN THE OREGON COAST RANGE. B.R. Kelpsas, M. Newton, Oregon State Univ.

(126) 3:40 A CONCEPTUAL MODEL OF THE INFLUENCES OF ENVIRONMENT AND SPECIES CHARACTERISTICS ON GLYPHOSATE INJURY. S.G. Conard, Oregon State University.

(127) 4:00 COMPARISON OF COMPACTION AND DISTURBANCE OF VOLCANIC ASH SOIL RESULTING FROM HARVEST WITH FOUR TYPES OF GROUND SKIDDERS. D.W. Breuer, Potlatch, Corp., Lewiston, Idaho.

(128) 4:20 PREDICTING PONDEROSA PINE PLANTATION YIELDS USING UNMANAGED STAND DATA. S.D.Tesch, H.R. Zuuring, J.L. Faurot, University of Montana.

(129) 4:40 WINNOW: AN ALL-AGED STAND PRESCRIPTION - MANAGEMENT DECISION FRAMEWORK. D. O. Hall, USDA-FS, Boise, ID.

Session 3B

Friday Afternoon, March 27, 1981

206 Milam Hall

Presiding: Dave DeYoe

(130) 1:00 SOILS, VEGETATION, AND FOREST REGENERATION ON TWO ADJACENT PARENT MATERIALS IN SOUTHWESTERN OREGON. D. Minore, K.A. Short, USDA-FS, Corvallis, Oregon.

(131) 1:20 ABOVE- AND BELOWGROUND N AND P REQUIREMENT AND UPTAKE IN IMMATURE AND MATURE Abies amabilis SYSTEMS, FINDLEY LAKE RESEARCH SITE. C.E. Meier, C.C. Grier, University of Washington.

(132) 1:40 RESPOND OF WESTERN HEMLOCK TO PHOSPHORUS FERTILIZATION. R.J. Zasoski, S.P. Gessel, Univ. of Washington.

(133) 2:00 FLOODING RESPONSES OF MATURE AND SEEDLING Quercus palustris IN A FLOOD PLAIN FOREST. R.A. Black, Washington State University.

(134) 2:20 ROOT PRESSURE IN Abies SEEDLINGS. R.B. Walker, E.C. S. Duffield, W. Lopushinsky, Univ. of Washington & USFS Hydrology Lab, Wenatchee, WA.

(135) 2:40 THE EFFECTS OF ASH ON THE GROWTH OF Armillaria mellea. J.L. Reaves, Atlanta University, Atlanta, GA.

3:00 COFFEE BREAK

(136) 3:20 POTENTIAL EFFECT OF MT. ST. HELENS'ASH ON FOREST GROWTH. J. Bethel, S.P. Gessel, R.J. Zasoski, R. Edmonds. University of Washington.

(137) 3:40 CHEMICAL PROPERTIES OF SOME ASH AND MUD FROM THE 1980 VOLCANIC ERUPTION OF MOUNT ST. HELENS. M.A. Radwan, D.L. Campbell, USDA Fish & Wildlife Service, USDA-FS, Olympia, WA.

(138) 4:00 SEED GERMINATION AND SEEDLING ESTABLISHMENT OF TREE & BROWSE SPECIES IN SOME ASH AND MUD FROM MT. ST. HELENS. D.L. Campbell, M.A. Radwan, USDI Fish & Wildl. Service, USDA-FS, Olympia, WA.

(139) 4:20 APPLICATION OF TWO-WAY THERMOGRADIENT PLATE FOR LODGEPOLE PINE GERMINATION. S. Pond, O. Sziklai, University of British Columbia.

(140) 4:40 GERMINATION AND GROWTH OF DOUGLAS-FIR SEEDS AS AFFECTED BY THE PROXIMITY OF PARENT TREES TO HIGH VOLTAGE POWER LINES. D.D. McCreary, D.P. Lavender, Oregon State University.

GEOLOGY/GEOGRAPHY SECTION

Thursday, March 26, 1981

206 Milam Hall

Presiding: Robert Lawrence

(141) 1:30 AMPHITHEATER-HEADED VALLEYS OF HAWAII: AN EXPLANATORY MODEL. M.M. Folsom, Eastern Washington University.

(142) 1:45 DEPOSITIONAL ENVIRONMENT OF SOME UNUSUAL QUATERNARY SEDIMENTS NEAR SPOKANE, WASHINGTON. J.G. Rigby, University of Idaho.

(143) 2:00 CATASTROPHIC FLOOD DEPOSITS FROM LAKE MISSOULA IN THE SPOKANE AREA. E.P. Kiver, D.F. Stradling, Eastern Washington University.

(144) 2:00 EVIDENCE FOR TWO LATE WISCONSIN TILLS AND A HIGH LEVEL EARLY WISCONSIN STAND OF GLACIAL LAKE COLUMBIA NEAR GRAND COULEE DAM, WASHINGTON. M.D. Milliken, Eastern Washington University.

(145) 2:15 MAIN SIDE DRAINAGE CHANNEL OF NE OLYMPIC MTS. IN ULTIMATE GLACIATION: PENULTIMATE GLACIATION ELEVATION. R. T. Roscoe, Seattle, WA.

(146) 2:30 GLACIATION OF THE VULCAN LAKE AREA, KALMIOPSIS WILDERNESS, OREGON. W. A. Long, Crescent City, CA.

(147) 2:45 THE ORIGIN AND SIGNIFICANCE OF SEVERAL HIGH-YIELD AQUIFERS IN THE COLUMBIA RIVER BASALT. R.E. Brown, Pasco, WA.

3:00 COFFEE BREAK

(148) 3:15 COMPARATIVE STUDY OF THE OLIGOCENE BRIDGE CREEK PALYNOFLORA AND THAT OF A MODERN COAST REDWOOD FOREST. K.N. Reiswig, L.H. Fisk, Western Washington University, Michigan State University.

(149) 3:30 MOUNT ST. HELENS' VOLCANIC ACTIVITY DURING THE 1800's AN UPDATE. K.L. Holmes, Oregon College of Education.

SCIENCE EDUCATION SECTION

Friday, March 27, 1981

247 Weniger Hall

Presiding: Fred Fox

(150) 1:30 DEVELOPING CONSERVATION ATTITUDES AND ENERGY CONCEPTS IN INDIVIDUALS OF VARIOUS COGNITIVE LEVELS USING THE ENERGY ENVIRONMENT SIMULATOR. D. Cartwright, M. Heikkinen, University of Idaho.

(151) 1:45 SCIENCE EDUCATION IN THE PEOPLE'S REPUBLIC OF CHINA. J.P. Smith, University of Washington.

(152) 2:45 SOME IMPLICATIONS OF MODERN PHYSICS FOR SCIENCE EDUCATORS. J.F. Hall, University of Victoria.

(153) 3:15 THE EFFECTIVENESS OF A TEACHERS' RESOURCE KIT ON PREPARING ELEMENTARY-SCHOOL STUDENTS FOR A FIELD TRIP. D.R. Stronch, University of Victoria.

3:35 BREAK

3:45 AETS (Northwest Region) BUSINESS MEETING

SOIL AND WATER SECTION

Session 1

Thursday, March 26, 1981

318 Milam Hall

Presiding: Chester Youngberg

(154) 1:30 ST. HELENS' ASH: RANGELAND IMPACT. F.A. Sneva, et al. SEA-AR, USDA, Oregon State University.

(155) 1:45 EROSION OF 1980 DEPOSITS OF MT. ST. HELENS. F.J. Swanson, B.P. Wicherski, R.D. Smith, USFS & Oregon State University.

(156) 2:00 EFFECTS ON THE FOREST FLOOR OF MT. ST. HELENS' 1980. G.O. Klock, Forestry Sciences Lab, Wenatchee, WA.

(157) 2:15 EFFECTS OF MT. ST. HELENS ASH ON NEEDLE LITTER DECOMPOSITION AND SOIL AND FOREST FLOOR MICROBIAL ACTIVITY. H.E. Erickson, R.L. Edmonds, Univ. of Washington.

(158) 2:30 INITIAL EFFECT OF MT. ST. HELENS ASH ON THE CHEMISTRY OF SOIL LEACHATES. D.W. Cole, R. Gonyea, Univ. of WA.

(159) 2:45 FOG DRIP IN THE BULL RUN MUNICIPAL WATERSHED, OREGON. R.D. Harr, USDA-FS, Corvallis, OR.

3:00 COFFEE BREAK

(160) 3:25 WATER QUALITY AFTER TIMBER HARVESTING, ONE SITE IN THE BULL RUN MUNICIPAL WATERSHED, OREGON. R.L. Fredriksen, PNW Station, Corvallis, OR.

(161) 3:40 EROSION CONTROL IN THE QUEEN CHARLOTTE ISLANDS. W.W. Carr, C.J. Marchant, University of British Columbia.

(162) 4:00 WILDERNESS WASTE MANAGEMENT AND WATER QUALITY IN THE ENCHANTMENT BASIN. G.O. Klock, Forestry Sciences Lab, Wenatchee, WA.

(163) 4:15 LIMNOLOGICAL RESEARCH AT CRATER LAKE, OREGON: HISTORICAL PERSPECTIVE. D.W. Larson, M.E. Forbes, Corps of Engineers and National Park Service.

(164) 4:45 IMPACT OF ALUM TREATMENT OF LIBERTY LAKE ON COLIFORMS AND STREPTOCOCCI. P. Bulson, D.L. Johnstone, Wash. State Univ.

5:00 SECTION BUSINESS MEETING

Session 2

Friday, March 27, 1981

318 Milam Hall

Presiding: Chester Youngberg

(165) 8:30 WASTE TREATMENT IN AN ALGAE-ZOOPLANKTON AQUACULTURE SYSTEM. J.C. Patrouch, Washington State University.

(166) 8:45 CHANGES IN THE WATER TABLE AND GROUND-WATER MOVEMENT AT THE HANFORD SITE 1955-1980. J.S. Wilbur, Battelle Northwest.

(167) 9:00 SORPTION OF TRACE Cs on 21 HANFORD SITE SEDIMENT TYPES. R.C. Routson, R.C. Barney, G.S. Smith, C. Delegard. Rockwell Hanford Operations.

(168) 9:15 WATER JET FOR RESTORATION OF SPAWNING GROUND. J. Kabir, Washington State University.

(169) 9:35 NITRIFICATION IN SOME FOREST FLOOR AND MINERAL SOIL SAMPLES. J. Otchere-Boateng, T.M. Ballard, Univ. of British Columbia.

9:55 COFFEE BREAK

(170) 10:20 THE INFLUENCE OF RED ALDER AND DOUGLAS-FIR ON SOIL NITRIFICATION CAPACITY AND NITRATE LEACHING. H. Van Miegroet, University of Washington.

(171) 10:40 SLASH DISPOSAL AND SOIL SOLUTION CHEMISTRY IN LODGE-POLE PINE CLEARCUTS. G.E. Hart, H.V. DeByle, Utah State University.

(172) 11:00 AN OUTLINE OF THE PROPOSED TAXONOMIC CLASSIFICATION OF HUMUS FORMS IN ECOSYSTEMS OF B.C. R.N. Green, R.L. Trowbridge, Ministry of Forests, B.C.

(173) 11:30 MIGRATION AND TRANSFORMATION OF NITROGEN COMPOUNDS IN HIGHLY PERMEABLE SOILS. G.C. Girolomon and D.L. Johnstone, Washington State University.

ZOOLOGY SECTION

Thursday, March 26, 1981

234 Milam Hall

Presiding: David deCalesta

(174) 1:30 SEASONAL VARIATION IN PROTOZOAN COMMUNITIES INHABITING ARTIFICIAL SUBSTRATES IN A SCABLAND POND. J.R. Pratt, Eastern Washington University.

(175) 1:45 SISTER CHROMATID EXCHANGE AS AN INDICATOR OF SHORT-TERM CHEMICAL STRESS IN AQUATIC SYSTEMS. C.A. Pernsteiner, N.V. Vigfusson, Eastern Washington University.

(176) 2:00 QUANTITATION OF SEX-SKIN SWELLING IN RESPONSE TO ESTRADIOL-17 BETA TREATMENT IN MACACA NEMESTRINA. L.A. Hansen, R.J. White, Eastern Washington Univ.

(177) 2:15 MARINE MAMMALS AND WASHINGTON'S GILLNET FISHERY. R.J. Beach, R.D. Everitt, Washington Dept. of Game, Astoria, OR.

(178) 2:30 BREEDING BEHAVTOR OF THE WESTERN WINTER WREN (Troglodytes Troglodytes Pacificus). Don Petersen, Western Washington University.

2:50 COFFEE BREAK

(179) 3:10 FIRE AND BIRD COMMUNITIES IN OLYMPIC NATIONAL PARK, WASHINGTON. M.H. Huff, University of Washington.

(180) 3:30 MEASURING CARDIAC OUTPUT: THE REFINEMENT OF A MATHEMATICAL MODEL. A.R. Anderson, Whitman College.

(181) 3:45 POLYPIED DEGENERATION IN MARINE BIOZOANS. I. Nelson, Western Washington University, Bellingham, WA.

ABSTRACTS OF PROGRAM PAPERS

1

Smith, D. M., PATTERNS OF DEVELOPMENT OF FOREST STANDS
Professor of Silviculture, Yale University

Most of the events in stand development are processes set in motion at the time of regenerative disturbances. They are powerfully influenced by the extent, severity and kind of damage inflicted by the lethal agencies that create vacant growing space. Subsequent development includes both relays of discretely different stages and complex changes among species initially present. The vegetation of any locality consists of a repertory of species collectively adapted to colonize any kind of vacant, available growing space that might come into existence by natural, lethal disturbance. Subsequent stand developments are controlled mainly by the adaptations of individual species, especially their regimes of height growth and shade tolerance.

2

Oliver, C.D. STAND DEVELOPMENT--ITS USES AND METHODS OF STUDY University of Washington, College of Forest Resources

Interpretation of forest stand development--or stand dynamics--has been practiced for a very long time, although recognition of it as a discipline to study has been recent. Specific, objective methods--often quite old but used in refined ways--are becoming accepted. Several techniques will be discussed, and examples of their uses will be given. These include: studies of chronosequences, permanent plots, autecological inferences, stand structures, disturbance patterns, forest mensurational analyses, and stand reconstruction. As forest development becomes better understood, more precise stand development information will become needed; the techniques will become more refined, systematized, and sometimes quantified--but hopefully not rigidified.

3

Larson, Bruce C. STAND DEVELOPMENT OF EVEN- AND MULTI-AGED STANDS OF GRAND FIR/DOUGLAS-FIR IN EASTERN WASHINGTON
University of Washington

Stand development of single and multiple age stands on the east slope of the Cascades are compared. The multi-aged stands were maintained by recurrent overstory cutting (last entry approximately 20 years ago). The even-age stands were unmanaged. In both age structures most volume was concentrated in upper crown strata. Distribution of stem biomass and growth patterns within species and crown strata were different between age structures. Height and diameter growth in lower crown strata of multiple age stands stagnated following a period of initial release after cuttings. This prevented a steady progression of trees to larger diameter and height size classes.

4

Veirs, S. D., Jr. COAST REDWOOD FOREST STAND DYNAMICS AND SUCCESSIONAL STATUS National Park Service

Stand dynamics in virgin redwood forest were investigated by determination of tree age and patterns of growth and establishment. The role of fire as an agent of disturbance controlling establishment and longevity was examined. In mesic sites, redwood (Sequoia sempervirens), tanoak (Lithocarpus densiflorus), western hemlock (Tsuga heterophylla) and other trees are components of an all aged climax forest which is self perpetuating with or without low intensity fire disturbance. Douglas-fir (Pseudotsuga menziesii) represents a long lived, fire dependent seral component of the redwood forest and increases in dominance inland where fire intensity and frequency are greater.

5

Cook, S. A. DYNAMICS OF MOUNTAIN HEMLOCK STANDS INFECTED WITH PHELLINUS WEIRII. Dept. Biology, Univ. Oregon, Eugene, OR 97403

The parasitic root-rotting fungus spreads radially vegetatively from an infected tree about 0.3 m per year into a mountain hemlock forest, forming rings of infection. Data on sizes and ages of all trees in two belts, that traverse the chronosequence so produced, support the conclusions that repeated cycles of infestation and reestablishment of trees within rings lead to a complex climax stand of relatively low biomass in which five conifers are interspersed in mixed age distributions.

6

Means, Joseph E. DEVELOPMENTAL HISTORY OF DRY-SITE DOUGLAS-FIR IN THE CENTRAL WESTERN CASCADES OF OREGON. Pacific Northwest Forest and Range Experiment Station, Corvallis, Oregon.

Douglas-fir and occasionally incense-ceder are apparently climax on hot, dry sites which comprise a small portion of the study area. Size structures, age structures and disturbance histories of two such stands are examined in detail and are supplemented by data from 70 other stands. Periodic fire has destroyed a portion of the trees in these stands throughout their discernible history. Subsequent regeneration becomes established in the shade of the residual canopy over a 30 to 60 year period resulting in an age structure with several modes and a reverse J-shape diameter distribution. This natural process of stand establishment has several implications for management of dry-site Douglas-fir.

7

Thornburgh, D.A. SUCCESSION IN THE MIXED FORESTS OF NORTHWESTERN CALIFORNIA
Humboldt State University

Competitive interactions between the major tree species, Pseudotsuga menziesii, Lithocarpus densiflora, Arbutus menziesii and Chrysolepsis chrysophylla determine the different successional stages. Relative initial densities of these species are dependent on type and degree of disturbance, density of sprouts, available seed sources and chance environmental conditions. Any of these species can initially dominate an area or any mixture can develop. Relative to the vegetation type, all successional sequences lead to the same mixed evergreen climax forest.

8

Arno, Stephen F. CLASSIFICATION OF FOREST SUCCESSION ON FOUR HABITAT TYPES IN WESTERN MONTANA. Int.For./Range Exp.Sta.

Classifications of the community types occurring throughout 300+ year successional cycles are being developed for four major habitat types in west-central Montana. These classifications designate compositional community types within each developmental/structural stage ranging from herb and shrub field to climax forest. The typical "pathways" that succession follows are shown in relation to type and intensity of disturbance treatment.

The data base is from 144 sites where an untreated ("control") stand was sampled along with one or more immediately adjacent treated communities. Treatments include wildfire and clearcutting, including various site preparations.

9

West, D.C., H.H. Shugart and T.M. Smith. FOREST SUCCESSION MODELS AND THEIR ECOLOGICAL AND MANAGEMENT IMPLICATIONS. Oak Ridge National Laboratory

A wide variety of forest stand simulation models have been developed in an attempt to further understand the underlying properties of succession. The models are not only of theoretical importance, but also provide an excellent predictive tool for exploring the effects of forest management practices on the dynamics of forested systems. Examples are presented on the use of forest simulation models for predicting the effects of timber management on the availability of wildlife habitat, with special emphasis on endangered species.

The use of forest models in determining the effects of pollutant stress on forest composition and dynamics is also explored, using the example of SO_2 pollution effect in east Tennessee. The possible uses of forest simulation models in the development of forest management policy are discussed.

10

Hemstrom, M. and Adams, V.D. MODELING FOREST SUCCESSION IN THE NORTHWEST. Willamette National Forest and the University of Washington

A model simulating succession of the coniferous forest of western Oregon and Washington has been developed. The model keeps track of characteristics of individual trees growing in a fifth hectare gap. Diameter increment for each tree is a function of the energy required for growth and maintenance of the tree, the effect of temperature on the photosynthetic rate, moisture stress, nutrient competition and shade tolerance. Both episodic and suppression mortality can occur. Birth is dependent upon existing water stress, temperature range, soil type for the geographic region of the plot and projected leaf area of the existing trees. Sprouting can occur for some of the 21 species in the model. The model can be used to assess the long-term effect of management trends, to increase understanding of successional processes and to indicate areas where knowledge is poor.

11

K.L. Reed, Senior Systems Ecologist, HDR-Sciences
SIMULATION OF FOREST STANDS IN A HYPOTHETICAL WATERSHED USING MODELS AND CARTOGRAPHIC ANALYSIS

A methodology for simulating forest growth and succession over large areas is discussed. The approach involves the use of simulation models of climatic and other environmental factors, the results of which are arrayed in maps. Cartographic analysis is used to define cells of relatively homogeneous environment. The forest model SUCcession SIMulator (SUCSIM) was run on each of the simulation cells, the output of which was used to generate maps of dominant trees and forest community types.

12

Stage, A. R., Ferguson, D. E. REGENERATION MODELING AS A COMPONENT OF FOREST SUCCESSION SIMULATION. USDA Forest Service.

This paper describes a method used to predict conifer succession following harvest and site preparation operations in the grand fir-cedar-hemlock ecosystem. Predictions are based on both ecological theory and empirical data collected using a carefully designed process for sample-selection. We treat the process of species establishment separately from the subsequent development of the vegetation. Ongoing inventories can be used to update and increase resolution of the model. Present version focuses on the conifer species because of their importance to forestry practice. However, through linkage to a model of the shrub and herbaceous species, interactions of these components of the vegetation can be represented. The assumptions and implications of the analysis technique are explained along with modeling strategy, uses of the model, and the degree of resolution which can be expected.

13

Pfister, Robert D., DESIGNING SUCCESSION MODELS TO MEET MANAGEMENT NEEDS
USDA Forest Service

Vegetative succession can be described, classified, and modeled in many ways. The problem of selecting modeling approaches to meet management needs is analyzed by (1) listing specific, multi-displinary, information needs, (2) aggregating specific needs in to generic needs, (3) specifying generic needs as desired model "outputs", (4) listing available and essential "inputs", (5) specifying alternative modelling approaches, and (6) evaluating alternative modelling approaches against needs in terms of estimated costs, precision, reliability, and general utility.

14

Zamora, B. UNDERSTORY DEVELOPMENT IN FOREST SUCCESSION: EXAMPLES FROM THE INLAND NORTHWEST.
Dept. For. and Range Manage., Wash. St. Univ., Pullman, WA 99164

Shrub and herbaceous species in the understory of forest stands demonstrate a high degree of ecological plasticity during the successional development of a tree overstory. Data are presented showing many species to occupy important compositional and structural roles in both early and advanced successional stages. These species achieve stability in composition and structure early in the sere, then fluctuate in response to successional changes in the overstory. The appearance of opportunistic species in early succession is frequently a function of the type of disturbance which initiates secondary succession. Aspects of this model are discussed with respect to grand fir and Douglas-fir forests in northern Idaho and eastern Washington.

15

Henderson, J.A. SUCCESSION ON TWO HABITAT TYPES IN WESTERN WASHINGTON. Olympic National Forest.

Nearly 200 vegetation plots taken in the middle Cascades and southern Olympics on the Tsuga heterophylla/Gaultheria shallon and Abies amabilis/Vaccinium alaskaense habitat types reveal long-term successional changes. The height growth of dominant Pseudotsuga menziesii reaches a plateau and levels off in the first 300 years on the Tsuga type but starts slower and maintains growth longer on the Abies type. Composition of the understory reaches an equilibrium early in both types. P. menziesii is the clear seral dominant on the Tsuga type, ceding to T. heterophylla in older stages, but playing a less important role on the Abies type, usually competing well only in the first century, if at all. T. heterophylla and A. amabilis are the apparent codominants, even at ages in excess of 600 years. Fire history and climatic change complicate the patterns apparent in the data.

16

Franklin, Jerry F. FOREST SUCCESSION RESEARCH IN THE PACIFIC NORTHWEST: AN OVERVIEW. Pacific Northwest Forest and Range Experiment Station, Corvallis, OR

Several trends are evident in the papers composing this symposium. Successional research is shifting in its techniques and perspectives. One major trend is from anecdotal accounts and inferences drawn from size structure analyses to analyses of forest age structures. Results have often modified or even contradicted earlier successional statements. Simulation models are a relatively new tool being used to synthesize existing knowledge, predict successional trends, and carry out experiments. Finally, there are altered perspectives on succession, which view it less as a deterministic, single track process and more as a stochastic and individualistic process.

17

Bookman, S.S. OFFSPRING SELECTION DURING FRUIT PRODUCTION. Botany Dept., Washington State University, Pullman, Washington.

Pod production in Asclepias speciosa was examined to determine why only 2.4% of all ovaries set fruit. It was found that of all ovaries, on the average 27.6% were not pollinated, 23.4% were pollinated but not sufficiently fertilized to initiate fruit development, and 46.6% aborted prior to mature pod formation. By experimentally hand-pollinating groups of flowers on different recipient plants with pollinia from known pollen donor plants, success of crosses could be compared. The pod production of different pollen donors varied significantly but in most cases was not correlated with variation in pollen germination estimates. The evidence suggests that formation of fruits is at least partially genetically determined. Aborted fruits may contain the unsuccessful competitors when parental resources are limited since embryo nutrition is in part genetically determined.

18

Broich, S. L. EVOLUTIONARY DYNAMICS OF CROP DOMESTICATION: SOYBEAN AS AN EXAMPLE.
Oregon State University

A man-imposed selection process, initiated with a harvesting-sowing cycle, results in the natural selection of agronomically important traits and the artificial selection of characteristics to meet man's needs and whim. The resulting domesticated entity is completely dependent upon man but achieves great mobility and is exposed to a wide range of environments and related wild populations. Continuing flow of genetic information can be found between wild and domesticated forms. This gene flow allows the domesticated forms to adapt to new environments and creates weedy by-products which infest the parental crop and(or) other niches in the agro-ecosystem.

Examples of this process have been reported in annual cereals and also can be seen in the soybean, Glycine max (L.) Merr. (Leguminosae).

19

Beatty, J.J. & H.G. Hanlin. A COMPARISON OF INTER-POPULATION PHENOTYPIC DIFFERENTIATION IN TWO NORTH-WESTERN PLETHODONTID SALAMANDERS. Oregon State University and University of South Carolina-Aiken.

Interpopulation phenotypic differentiation was examined in Plethodon dunni and Aneides ferreus utilizing discriminant analyses. These data, when correlated with the distribution and ecology of these species indicate that phenotypic differentiation between populations may not only be dependent upon natural selection, but that genetic drift and lack of gene flow between populations may also be important in structuring phenotypes in populations of these species.

20

Brown, Herbert A. SPECIATION AND BIOGEOGRAPHY OF THE WESTERN SPADEFOOT TOAD, SCAPHIOPUS HAMMONDII Western Washington University

The disjunct, eastern population of the western spadefoot toad (Scaphiopus hammondii) is now called S. multiplicatus. This separation is based upon comparison of external morphology, physiology, genetic compatibility, mating calls and tissue protein. Interspecific comparisons of mating calls may reveal population interactions of these species with other spadefoot toads (S. bombifrons and S. intermontanus). A biogeographical analysis based primarily on mating calls is presented.

21

Anderson, A.V., and R.J. Taylor. PATTERNS OF MORPHOLOGICAL VARIATION IN CASTILLEJA (SCROPHULARIACEAE). Department of Biology, Western Washington University

Many species of Castilleja lack clearly defined limits. Complex variation patterns are due to extensive hybridization often accompanied by polyploidy. In this study, 100 plants from a large and variable population of sympatric species were systematically analyzed using numerous morphological characters in order to determine natural groupings and to compare these with traditionally-keyed species: C. parviflora, C. hispida, C. rhexifolia and C. elmeri. Multivariate analyses indicated that: 1) C. parviflora is a distinct species; 2) C. hispida, C. rhexifolia, and C. elmeri form a species-complex, with C. hispida and C. elmeri linked by the intermediate C. rhexifolia; 3) in spite of morphological overlap, traditional keys are effective in delimiting species in a mixed population.

22

Leonard, R. L. and E. D. McArthur ELECTROPHORESIS OF ISOENZYMES OF WESTERN SHRUBS USFS Shrub Sciences Laboratory, Provo, Utah

Wildland shrubs have gained significant attention in recent years due to their economic importance and potential for revegetation of disturbed sites. This study embodies an initial investigation of shrub phylogenies using polyacrylamide gel electrophoresis. The position and intensity of isoenzymes inherent within species may be quantitatively assessed to reveal similarities in their genetic variability and evolutionary relationships. In this study, 16 selected species are shown to conform to current taxonomic placement within the composite, chenopod and rose families.

23

Dancik, Bruce P. ENZYME VARIATION OF DOUGLAS-FIR POPULATIONS IN ALBERTA
Department of Forest Science, University of Alberta, Edmonton, Alberta T6G 2G6 CANADA

Megagametophytes of 99 Douglas-fir (Pseudotsuga menziesii var. glauca (Beissn.) Franco) from five natural populations along the eastern slopes of the Rocky Mountains in Alberta were subjected to starch gel electrophoresis. Twenty-six loci in 17 enzyme systems were scored to characterize allozyme variation within and among the populations and to compare them with those reported from B.C. Eight loci exhibited high levels ($\bar{>}$.45) of heterozygosity; average heterozygosity was .231. Alleles at five loci had frequencies markedly different from those reported from B.C. populations. 67% of the loci were polymorphic. Genetic distances between Alberta and interior B.C. populations were similar to those between interior and coastal B.C. populations; those between Alberta and coastal B.C. populations were similar to those reported between other tree species.

24

Bookman, P. A. RELATIVE TIMING OF EMERGENCE: THE ROLE OF ROOT SYSTEMS IN INTERSPECIFIC COMPETITION Botany Dept. Washington State University, Pullman, WA

The dynamic nature of root competition between two alien grasses, Bromus tectorum L. and Poa pratensis L. was examined using a double-labelling radioisotope technique. Interactions between the species' root systems lead to a restricted B. tectorum rooting volume in P. pratensis neighborhoods greater than 30 days old. B. tectorum roots were excluded from lateral soil zones probably by locally depleted resources.

25

Perry, D. A. and Pitman, G. B. SPRUCE BUDWORM-DOUGLAS-FIR INTERACTIONS: VARIABILITY OF FOLIAGE QUALITY WITHIN AND AMONG HOST POPULATIONS
Forest Science Department, Oregon State University

Considerable variability in survival of spruce budworm was found when a laboratory colony was reared on artificial diet supplemented with foliage from seedlings raised from seed of east and west side Douglas-fir populations. Variability in larval survival was found between and among host families with maximum and minimum levels of survival occurring on diet supplemented with east side foliage. A lesser but significant degree of survival variability was found in colonies being reared on diet supplemented with west side foliage. Gas-chromatographic analysis of these families gave a positive correlation between larval survival and the quantitative and qualitative differences in foliar volatiles. These preliminary results suggest a broad genetic base of allelochemic regulation of herbivory in some populations of Oregon Douglas-fir.

26

Zirkle, D.F., Correlated Changes in Cannibalistic Behavior in Tribolium castaneum as a Result of Artificial Selection for Dispersal Ability
Oregon State University

Two-way artificial selection for dispersal behavior in a species of flour beetles (Tribolium castaneum) produced non-overlapping lines consisting of high and low dispersal ability. In addition, there have been correlated changes in cannibalistic behavior as a result of artificial selection for dispersal ability. The high dispersal line exhibits low rates of egg cannibalism by both larvae and adults. In contrast, the low dispersal line shows high rayes of egg cannibalism by both life-history stages. I interpret this association between dispersal ability and cannibalistic behavior as evolutionarily adaptive. Individuals colonizing new areas would be more likely to encounter their own eggs, and as a result, natural selection should favor those genotypes which reduce rates of egg cannibalism in dispersers.

27

Adams, V.D. SENSITIVITY OF A COEVOLVED PLANT-POLLINATOR SYSTEM TO VARIATIONS IN LIFE-HISTORY TACTICS. University of Washington.

Predictions of life-history traits of animal pollinated plant species are tested with a simulation model to determine conditions under which extinction occurs. The results are compared to data on five species of Pedicularis growing sympatrically in Berkeley Park, a subalpine meadow on Mount Rainier. The study indicates that the plants are more likely to survive if they are perennial and if they are visited by pollinators with relatively high constancies. Variations in the number of pollen grains are important only in the way this reward affects pollinator activities. Plants with a relatively nigh number of seeds resulting from one bee visit have a competitive advantage. There are a number of ecological consequences for obligately outbreeding plant species that have these life-history characteristics.

28

Christy, E. J. ECTOMYCORRHIZAL COLINATION OF WESTERN HEMLOCK SEEDLINGS IN DIFFERENT MICROSITES
Botany Dept. Washington State University, Pullman WA

During summer 1980, western hemlock seedlings were collected from several substrates, bare mineral soil and 3 decay classes of Douglas fir logs, within the Tsuga zone and in the Tsuga-Abies zone on the H.J Andrews Exp. Forest in the western Cascades of central OR. Seedlings were aged and no first year seedlings were found to have ectomycorrhizal associations. The older seedlings were analyzed by ranking ectomycorrhizae by color and form. The micobiont flora of seedlings growing in bare mineral soil was greater than the flora from seedlings rooted on down logs. Bare soil in these forests is limited to mounds and pits of treefalls or along trails and are not abundant germination safe sites for tree species of old growth forests. It has not been previously reported that a tree seedling can survive for at least 7 months without the mutualistic relationship of mycorrhizae.

29

Dawson, Peter S. ADAPTIVE VARIATION IN RECOMBINATION FREQUENCY
Department of Zoology, Oregon State University

There is a vast theoretical literature addressed to the questions of why sexual reproduction and crossing over are so prevalent among living organisms. The answers are, for the most part, rather unsatisfactory. It would seem that an experimental approach is long overdue. Based on the natural history of flour beetles, Tribolium castaneum, I hypothesized that a particular environmental factor (namely flour conditioned by the activities of the beetles themselves) would lead to an increase in crossover frequency. The hypothesis will be developed and the results of an experimental test of the hypothesis will be presented and discussed.

30

Nadkarni, N.M. CANOPY ROOTS: CONVERGENT EVOLUTION IN TEMPERATE AND TROPICAL RAINFOREST NUTRIENT CYCLES. University of Washington.

Rainforest vegetation which grows upon heavily leached soils of low nutrient content requires efficient mechanisms of nutrient transfer and retention. Nutrient transfer from vegetation to the forest floor occurs by decomposition and subsequent uptake of timberfall and litterfall, and by precipitation moving through the canopy. I have discovered an additional transfer pathway manifested in the canopy of a number of rainforest trees, both in a temperate rainforest (Olympic Peninsula, Washington State) and a tropical cloud forest (Monte Verde, Costa Rica). Host trees put forth adventitious roots that run beneath thick mats of accumulated organic material and the epiphyte community they support. These roots give host trees direct access to canopy nutrient sources which are unavailable to surrounding vegetation.

31

Tuljapurkar, S.D. R-SELECTION WITH GENES, AGE-STRUCTURE AND FLUCTUATIONS
Portland State University

The ephemeral nature of r-selection arguments is partly due to the lack of a dynamical basis in the genetical theory of age-structured populations. I will identify a fitness for life history phenotypes in fluctuating environments, derived from the full dynamic equations. I will also present an analytical formula for this fitness and illustrate some of its consequences (eg., in the iteroparity-semelparity debate, and for optimality arguments).

32

Jansen, David W. PREY PREFERENCE AND THE RELATIONSHIP OF ALLOMETRIC GROWTH IN THE SKULL OF THAMNOPHIS ELEGANS VAGRANS. Washington State University.

Field studies of the wandering garter snake (Thamnophis elegans vagrans) have shown a relationship between snake size and type of prey taken, prey preference shifting from small to large as the snake grows (C.R. Peterson and R.B. Lowell, pers. comm.). To test whether this ontogenetic change was reflected in the cranial morphology of the species, 15 skulls were measured for 37 features. For each feature the values were regressed on skull length to indicate whether isometric, positive or negative allometric growth occurs. Important features exhibiting positive allometry were 1) the bones forming the linkage system 'gaping' the dentiferous bones and 2) bony processes that serve as sites of attachment for abductor and adductor muscles of the jaws. Dentiferous bones that swing about a point of rotation grew with negative allometry. These findings seem to support the idea of differential growth as a factor to allow handling of increasingly larger prey.

33

Maurer, T.A. FLOWER AND FRUIT PRODUCTION IN A PERENNIAL LUPINE AND SEED DESTRUCTION BY CURCULIONID WEEVILS. University of Oregon.

Seed crops of a perennial legume, Lupinus caudatus (tailcup lupine) may sustain nearly complete destruction by a curculionid weevil, Tychius lineelus (lupine seed weevil). Lupinus populations located in the arid grasslands of north central Oregon are the focus of questions regarding the characteristics of flower and fruit production and insect oviposition which may influence the outcome of this particular interaction. The reproductive dynamics of the plant, including variations in the phenology and number of flowering racemes and distribution of immature and mature fruits are considered along with data on the egg distribution, larval survivorship and adult abundance of the weevil.

34

H. G. Larew Tannins and Gall-Wasps
Department of Entomology

Feeny (1970, Ecology 51:565) suggested that foliage-feeding insects on oaks escape tannins in time or in space. Examination of the structures of oak galls caused by 3 species of cynipid wasps revealed that the cells upon which the wasp larvae feed are relatively low in tannins (ferrous sulfate stain), and are cytoplasmically rich. Thus, these gall-formers avoid most host plant tannins by a method that differs from other oak foliage-feeding insects. By means of a poorly understood process, the gall insect directs the development of host plant cells upon which it feeds. These food cells apparently provide the larva with a nutritious diet that is low in host plant tannins.

35

Rosenfeld, C.L., Remote Sensing of the Volcanic Geography Eruption of Mt. St. Helens, WA.
Oregon State University

Aerial platforms and a variety of photographic and electromagnetic sensors were effectively employed prior, during and following the volcanic eruption of Mt. St. Helens on May 18, 1981. The use and interpretation of aerial imagery added considerably to the information traditionally acquired by geologists and geophysicists during eruptive events, and continues to provide a variety of data to scientists involved in the subsequent monitoring and resource recovery effort. The aerial remote sensing also provides a valuable archive of data for scientists researching related events in the future.

36

Carson, R.J., 1980 SUMMIT DEFORMATION OF MT. ST. HELENS, WASHINGTON, Whitman College

An east-west trending graben between the true and false summits of Mt. St. Helens was apparent on March 27, the date of the first phreatic eruption. By April 13 extensive doming and crevassing of glaciers had occurred on the upper north flank of the volcano in an area later named the Forsyth Bulge. Photographs taken from 1968 to 1980 may be evidence for considerable subsidence of the false summit by April 13. At least three fractures with steep north dip were evident by May 2. The U.S.G.S. reported that movement of the Forsyth Bulge was about 1.5m/day from April 25 to May 18. The growth of the Forsyth Bulge may have been a result of transfer of material from the summit graben and false summit as well as a response to rising magma.

37

Peterson, Donald W. SCIENTIFIC INVESTIGATIONS OF MOUNT ST. HELENS BY THE U.S. GEOLOGICAL SURVEY
U.S. Geological Survey, Vancouver, WA

Studies at Mount St. Helens fall into three major categories: monitoring the volcano; study of volcanic products; hazard assessment. Monitoring activities performed regularly include seismic recording, ground deformation measurements, gas detection, and magnetic field determinations; intermittent monitoring includes chiefly gravity, geoelectric, and electromagnitic measurements, and video surveillance. Representative studies of eruptive products include collection and analysis of samples, geologic mapping and related field and laboratory studies of deposits, and interpretation of eruption dynamics. Hazard assessment utilizes results from all studies in the attempt to forecast short-, intermediate-, and long-term future behavior of the volcano.

38

Malone, Steve SEISMICITY ASSOCIATED WITH THE ERUPTION OF MOUNT ST. HELENS
Geophysics Program, University of Washington

On March 20, 1980 an earthquake sequence began with a single M=4 earthquake beneath Mt. St. Helens. This sequence continued for the next 2 months with some earthquakes as large as M=5. There were no unusual changes in the seismic activity in the hours preceding the cataclysmic eruption of May 18.

There have been 7 subsequent major eruptions which have had recognizable seismic precursors. These precursors include increases in harmonic tremors before the eruption of May 25, June 12, and August 7; and shallow earthquake swarms before the explosive eruptions of July 22 and October 16-18. The dome-building eruptions of December 28 - January 4 and February 5-9 were also preceded by earthquake swarms.

39

Clara M. Fairfield
Acoustic Effects of the Mt. St. Helens Eruption
The Oregon Museum of Science and Industry

The study is a compilation of over 1200 reports from individuals in the Pacific Northwest - Washington, Oregon, Idaho, Montana, California and British Columbia - who either heard or felt the sound and shock waves or who did not hear the eruption. An explanation of the phenomenon along with comments gleaned from the responses on barometric pressure changes, shock waves, earth tremors and interesting animal reactions will be included. A short question and answer period will complete the program.

40

Carpenter, Philip J., THE HYDROLOGIC ASPECTS OF THE MAY 18, 1980 ERUPTION OF MOUNT ST. HELENS, WASHINGTON, U.S. Geological Survey

The eruption of May 18, 1980 produced mudflows on most streams draining the mountain and altered the hydrologic characteristics of and processes occurring in the drainage basins. Mudflows contained 85 percent sediment, destroyed roads and equipment, and deposited up to 5 meters of sediment in the stream channels and their overbanks. More than 2 billion m^3 of unconsolidated debris were deposited in the river valley in depths up to 200 m. The materials raised the level of Spirit Lake 60 m and blocked the tributary inflow of 5 streams, reducing the drainage area of the N.F. Toutle River by more than 50 percent. The blast stripped all trees from 400 km and deposited volcanic ash in depths up to 2 m. The ash and blast materials were heated to over 1000°C and more than 50 fires are smoldering at all depths.

41

42

Rooth, Guy H. RAPID PYROCLASTIC FLOWS ON THE SOUTH FLANK OF MOUNT ST. HELENS DURING THE ERUPTION OF MAY 18, 1980.
Oregon College of Education, Monmouth, Oregon 97361

On the afternoon of May 18, 1980, shortly before 4:00 p.m., a small, rapid pyroclastic flow (nuée ardente) was observed and photographed on the south flank of Mount St. Helens. The flow, consisting of a basal avalanche and suspended cloud, traveled at speeds estimated to be between 60 and 100 miles per hour. The flow is thought to be the result of a partial collapse of the eruptive column. Evidence is also presented, based upon photographs taken by amateur photographers, of a similar feature forming on the south flank shortly after 2:00 p.m. on the same day.

43

Casadevall, Thomas J. GAS EMISSIONS FROM MOUNT ST. HELENS. U. S. Geological Survey, Vancouver, WA

Study of gas emissions from Mount St. Helens began on March 29, 1980. The purpose of gas studies is to identify the chemistry and abundance of gas emissions and to study the relationship between these emissions and the activity of the volcano. The principal source of gas emissions is the crater, and since June, 1980, the successive domes located in the crater. Gas samples collected in the plume and directly from fumaroles within the crater contain the following gases in addition to air: H_2O, CO_2, CO, H_2S, SO_2, COS, CS_2, H_2, and CH_4. Emission rates of SO_2 and CO_2 are determined by airborne measurements made in the gas plume emanating from the crater during non-explosive activity. Emission rates of SO_2 have decreased steadily from a peak average of 1500 metric tons per day in July, 1980, to 400 tons per day in January, 1981. CO_2 emission rates have decreased from 12,000 tons per day in July, 1980 to 1500 tons per day in January, 1981.

44

Johnson, A. G., TILT MEASUREMENTS ON THE SOUTH SIDE OF MOUNT ST. HELENS
Portland State University

Two tiltmeters were installed on the south side of Mount St. Helens in June and July, 1980. The difficulties of access to the sites after installation and the environmental conditions have led to spotty recording. The lack of coherent tilt related to the location of the mountain indicates some more complex system is operating. One tilt site located four kilometers southeast of the mountain clearly shows earth tidal tilt. If the mountain were simply inflating or deflating it should show up at that sensitivity. The other site eight kilometers to the southwest doesn't show radial tilt either.

45

Carpenter, Philip J., ONE LEGACY OF MOUNT ST. HELENS - A HYDROLOGIC NIGHTMARE, U.S. Geological Survey, Tacoma, Washington

The eruptions of Mt St Helens have altered the hydrologic characteristics of and processes in its drainage basins. More than 2 billion m^3 of debris were blasted into the N.F. Toutle River and mudflows deposited 5 m of sediment in the downstream rivers. Ash deposition and removal of trees has caused a marked decrease in infiltration and increase in peak flows. Suspended-sediment concentrations range to 250,000 mg/L during storm runoff and stream channels are subject to large-scale cutting and filling. Two debris retention reservoirs were filled and more than 33 m^3 of sediment has been dredged from the Cowlitz River. Three hazards remaining are 3 lakes forming on tributaries blocked by the debris, possible pyroclastic flows on snowpack and the production of organic compounds. The first of these 2 could result in large floods and mudflows.

46

Quinn, Robert. THE DOWNWIND CHARACTERISTICS OF THE JULY 22, 1980 ERUPTION OF MOUNT ST. HELENS. Eastern Washington University

The July 22, 1980 eruption of Mt. St. Helens deposited downwind approximately $2x10^{10}$ kilograms of tephra. A long, narrow ash plume spread rapidly northeastward depositing visible ashfall over approximately 50,000 km^2 of Washington, Idaho and southwestern Canada. Maximum ashfall depths of 2-3 mm occurred in northeastern Washington and northern Idaho, 450 km downwind from the volcanic vent. Vegetation complexes were covered with visible ash for ten days following the primary eruption. Particle size and bulk density decrease with distance downwind.

47

Bankofier, D. E. DESIGN AND CONSTRUCTION OF DEBRIS STRUCTURES ON TOUTLE RIVER, MT. ST. HELENS, Corps of Engineers.

The May 18th, 1980 eruption of Mt. St. Helens resulted in the deposition of millions of cubic yards of sediment in the Toutle, Cowlitz and Columbia Rivers. Debris Restraining Structures were designed and constructed on North and South Toutle Rivers to minimize sediment transport. Flow through rockfall embankments, gabion spillways, low embankment height and short construction time characterize unique features of this work.

48

Newhall, C. G. ASSESSMENT OF VOLCANIC HAZARDS AT MOUNT ST. HELENS
U.S. Geological Survey, Vancouver, WA

Assessments of volcanic hazards at Mt. St. Helens are based on 1) the geologic record of previous eruptions at Mt. St. Helens, 2)historical accounts of eruptions at Mt. St. Helens, 3) historical accounts of eruptions at similar volcanoes elsewhere in the world, and 4) information from monitoring studies at Mt. St. Helens. One need in volcanic hazard assessment at St. Helens is to move from qualitative probabilities of various events (high, moderate or low, relative to the past geologic history of St. Helens and/or volcanoes worldwide), to more quantitative probabilities of these events at specific points around the volcano. Risk, the probability of loss of life or property due to volcanic activity, can then be estimated in units comparable to risks of familiar activities.

49

Adams,A.B.,Adams,V.D.,Kruckeberg,A.R., and Wilson,B. EFFECTS AND RESPONSES OF THE VEGETATION TO THE MT. ST. HELENS ERUPTION. Univ. Washington and Dept. Natural Resources.

Monitoring the recent events on Mt. St. Helens has required unique approaches. Major types of disturbances of the vegetation include the crater, pyroclastic flows, debris avalanches, mudflows and blast and singe zones. Differences in the vegetation responses in these areas are a function of the intensity of the disturbances and whether live plant parts remain above or below ground. Greenhouse studies of seven tree species suggest variable responses to the mudflow substrate. Initial results indicate that the fundamental niches of the trees are related to the interaction of water and nutrients. Germination rates for the trees on the mud are less than the rates under optimal conditions with Pinus contorta and Pseudotsuga menziesii having the highest values in both treatments. Analysis of tree seedlings grown in the mud for 5 months show that Alnus rubra has the greatest weight increase over initial seed size. Expected successional trends will be discussed.

50

Moser, T.J., J.R. Swafford and T.H. Nash EFFECTS OF MOUNT ST. HELENS EMISSIONS ON LICHENS OF SOUTHWESTERN WASHINGTON Arizona State University

Samples of Lobaria pulmonaria and Peltigera aphthosa were collected in October, 1980 from forested sites within 50 km of Mount St. Helens which had received relatively thick deposits of volcanic ash. Internal elemental analysis of thalli via energy dispersive spectroscopy revealed significant increases in silicon and aluminum in both species. Both species revealed significant reductions in potassium, a frequent response to injury noted in lichens. In addition, both species demonstrated reductions in photosynthetic activity and total chlorophyll content.

51

Mastrogiuseppe, Joy D., and Steven J. Gill. PRIEST RAPIDS VEGETATION AND MT. ST. HELENS ASH. Marion Ownbey Herbarium, Washington State University.

Priest Rapids, 16 km south of Vantage along the west-southwest shore of the Columbia River, typifies the diversity of habitats of central Washington steppe. At least 14 rare plant species occur in the area, including the endemic *Astragalus columbianus*. Semi-permanent vegetation plots were established in rare plant areas and surveyed during April, 1980. Plots which were accessible three weeks after the May 18 eruption of Mt. St. Helens were checked for effects of the ash deposited. At the time of the ash fall, seed dissemination had already occurred for early-flowering species; seeds of other species were ripe; and fruits of phenologically later species were not yet mature.

52

Senger, C.M. SOME OBSERVATIONS ON THE LOWER SOUTH SLOPES OF MT. ST. HELENS AUGUST AND NOVEMBER 1980. Western Wash. U., Bellingham.

Two to five cm of tephra had accumulated at elevations of from 340-1000 m and caused little direct damage. Flowers were in bloom in August and many healthy mosses, ferns and clubmosses were seen in November. The needles of true firs had trapped tephra resulting in the death of some old needles but this had not happened on douglas, hemlock and pine. Rapid and slow mudflows had covered extensive areas up to 10 km from the summit resulting in the obvious death of many of the smaller trees and probably the smothering of the root systems of most of the remaining large trees along N818.

53

Antos, Joseph A. and Donald B. Zobel. EFFECTS OF MOUNT ST. HELENS TEPHRA ON FOREST UNDERSTORY PLANTS AS MODIFIED BY SNOWPACK Oregon State University

Vegetation on both natural tephra and cleared plots was analysed at a deep (12 cm) and a shallow (4.5 cm) tephra location in old-growth forest northeast of Mount St. Helens. At each location one site was snow covered at the time of tephra deposition and another was not. Shrub coverage decreased greatly where tephra fell on snow but not where tephra fell on the forest floor. Density of shrubs and small trees decreased in all cases but especially on snowy sites. Herbs varied in response but snow made little or no difference for most species. Beargrass coverage decreased greatly on snowy sites. Mosses were almost eliminated on all sites. The timing of volcanic eruptions in relation to presence of snowpack is important in modifying plant response.

54

del Moral, Roger. VEGETATION RECOVERY ON MOUNT ST. HELENS: A PRELIMINARY REPORT. Dept. of Botany, University of WA, Seattle.

The May 18, 1980 eruption of Mt. St. Helens and the several subsequent blasts affected subalpine habitats on the cone in many ways, ranging from obliteration to minor tephra deposits. The first of a series of permanent plots were established between 1375 and 1700 m in several places. Snow protected many sites from tephra and mitigated blast effects. Many herbs, such as Lupinus lepidus, can penetrate over 10 cm of loose deposits. Rapidly melting glaciers spawned mudflows that buried or swept away vegetation. Buried plants, like Aster ledophyllus, emerged from the thinner flows during 1980. The reestablishment sequence on any site depends on the degree of residual survival, the proximity of recolonization sources, and, of course, subsequent disturbances.

55

Opitz-Reiswig, D.M. GROWTH STUDIES ON THE RED ALGA IRIDAEA CORDATA (TURNER) BORY. Walla Walla College

The marine red alga, Iridaea cordata (Turner) Bory, was grown in situ to determine the relationship between growth of surface area and growth of thickness as well as any growth differences between the diploid carposporic and the diploid tetrasporic phases. I. cordata obtained its maximum thickness before expanding to its greatest surface area. No significant difference was found between carposporophytes and tetrasporophytes with regard to this growth strategy.

56

Kentula, M. E. and C. D. McIntire. GROWTH DYNAMICS OF A Zostera marina L. BED IN NETARTS BAY, OREGON. Oregon State University

Monthly changes in biomass, growth form and primary production of a Zostera marina L. bed were monitored in Netarts Bay, Oregon. Morphological features measured included: leaf area and numbers, epiphyte load, and seedling, vegetative turion and reproductive turion density. Biomass was measured for the benthic microflora, Zostera, epiphytes and associated litter. Zostera leaf production and export were measured by a modified Zieman technique. Primary production of Zostera and epiphytes was measured by the ^{14}C method.

Zostera growth was affected by the tidal height in the winter, and by an Enteromorpha bloom and the area's ability to retain water in pools during the low tides in the summer.

57

Moore, Barry C., William H. Funk and Harry L. Gibbons. RELEASE OF SEDIMENT PHOSPHORUS BY ELODEA CANADENSIS. Washington State University.

Studies at Liberty Lake, near Spokane, Washington from 1974 to the present have implicated aquatic macrophytes in the cycling of phosphorus from sediments to the lake water. Such internal loading of phosphorus from the decay of macrophyte populations during the fall triggers prolific "blooms" of blue-green algae. In an experiment using P-32 as a tracer, it was found that *Elodea canadensis*, an important aquatic macrophyte at Liberty Lake, could translocate phosphorus from lake sediments and release this phosphorus into the water at a rate of 0.058 mgP/g dry weight plant material/day.

58

Cardon, N.C. EFFECT OF NUTRIENT ENRICHMENT ON BENTHIC DIATOMS IN YAQUINA BAY, OREGON Oregon State University

Silty-sand and sandy sediments were fertilized with f/2 algal growth medium in situ and in the lab at low tide daily for one week. Experiments were done in August and January. No significant changes in chlorophyll a or diatom community structure were observed after ten days of growth. Lab experiments also did not show increased gross primary production associated with nutrient addition.

Unlike planktonic diatoms, sediment associated diatoms in Yaquina Bay show no nutrient limitation. Thus other factors probably control diatom growth in these sediments eg. daylength, intertidal height, sediment stability, and animal consumption.

59

Amspoker, M. C. and C. D. McIntire. BENTHIC PRIMARY PRODUCTION IN THE COLUMBIA RIVER ESTUARY. Oregon State University

Rates of benthic primary production were investigated relative to chemical and physical gradients in the Columbia River Estuary. Rates of production ranged from 0 to 430 mgC $m^{-2}hr^{-1}$. Rates of production were highly correlated with benthic chlorophyll a concentrations and physical properties of the sediment and poorly correlated with light intensity and temperature. Chlorophyll a concentration is a good predictor of rates of primary production. The eruption of Mt. St. Helens had little or no effect on benthic primary production in the estuary.

60

Davis, M.W. & H. Lee, II. EFFECTS OF INFAUNA ON BENTHIC MICROALGAL BIOMASS AND PRODUCTION IN AN OREGON ESTUARY. OSU Botany Dept. & Marine Division, EPA,OSU Marine Science Center, Newport, Oregon.

Colonization of defaunated sediment from a silty-sand flat in Yaquina Bay, OR, was followed in the lab and in situ. The absence of infauna, primarily tanaids, allowed significant increase in chlorophyll a and gross primary production in sediments. Field experiments showed similar trends. Community O_2 uptake was constant in both cases. These experiments support the contention that infauna exert a controlling influence on the microphytobenthos heretofore unrecognized in soft-bottom benthic communities.

61

Rosentreter, R. The Zonation of Mosses and Lichens on the Salmon River, in Idaho. Univ. of Montana

The mosses and lichens along the Salmon River, in Idaho are viewed as distinct zonal associations. These zones are as much as several meters in depth. Based on the species present and on recurrent flood levels, four distinct zones were found. Results from paired transects indicate that the stability of the substrate, the force of the current, and the height above the low water level determined which species dominates. A comparison of data from the headwaters and those downstream indicates that the lower reach of the river has more favorable conditions for growth and zonation of both mosses and lichens.

62

Palmer, K.A., Rogers, J.D., Dobyns, E.V. and M.A.M. Bell. Epiphyte community variation on Quercus garryana Dougl. in Mount Douglas Park, Victoria, B.C.. University of Victoria.

Two lichen dominated epiphyte communities are described on Garry oak (Q. garryana) in mixed Douglas fir-Garry oak woodlands on South Vancouver Island. Foliose lichens such as Parmelia glabratula (Lamy) Nyl., and Parmelia sulcata Tayl. are the principal epiphytes found in pure Garry oak forests whereas bryophytes and crustose lichens such as Isothecium cristatum (Hampe) Robins. and Opegrapha pulicaris (Hoffm.) Schrad. characterize the mixed forests and fringe areas. Variation in epiphyte distribution appears to be influenced by moisture gradients, exposure to wind and insolation, bark topography and surrounding vegetation. Competition and succession are discussed.

63

Leslie, K. B. and C. H. Driver. PALEOPATHOGEN College of Forest Resources, University of Washington

A 3240 (+ 150) year old Ephedra sp. host has been found to exhibit a remarkably well-preserved Ascomycete. The fungus Wettsteinina ellisii Barr is presently reported on needles of Pinus murrayana and has been found to occur infrequently on gymnosperms. The significance of this report is thought to be the age of the collection and the outstanding high degree of preservation observed. If this proves to be true, such findings can be a major step forward in paleomycological studies.

64

THE SARCOSCYPHACEAE OF WESTERN OREGON

WILLIAM DENISON, ASSOC. PROF., O.S.U.

The Ascomycete family Sarcoscyphaceae is represented in western Oregon by four species in three genera. All four have brightly colored (red, orange, or yellow) apothecia, but are seldom collected, probably because they are small and occur in late winter or immediately following snow melt. Three species decay conifer foliage and twigs: the fourth grows in dead hardwood branches. None is pathogenic. The family contains species which may link the order Helotiales with the order Pezizales.

65

DID HIGHER FUNGI EVOLVE FROM RED ALGAE: A REVIEW.

WILLIAM DENISON, ASSOC. PROF., O.S.U.

Evidence suggests that higher fungi (Ascomycetes and Basidiomycetes) evolved from red algal ancestors, and that lower fungi (Chytridiomycetes, Oomycetes, and Zygomycetes) evolved independently from other ancestral lines. The primitive Ascomycete was probably a pyrenomycete. The earliest Ascomycetes and Basidiomycetes on land were probably wood-rotting fungi. The categories Plectomycetes, Fungi Imperfecti, and Lichenes should be abandoned.

66

Kautz, D. R. FLORA OF WILD HORSE ISLAND, FLATHEAD LAKE, MONTANA. School of Forestry, University of Montana, Missoula.

During a baseline study of Island soils, vegetation, and wildlife, 285 species of vascular plants were identified. Silene spauldingii, an endangered species, was observed in 2 grassland locations. In the grasslands, the maximum number of native species per habitat type occurred near the center of a combined temperature-moisture gradient; departure toward either extreme reduced species diversity. About 23% of the flora was exotic. Bromus tectorum and Poa pratensis, the 2 most abundant exotics, presently dominate the majority of the grasslands; these species are common in many forest understories. Many other exotic species are apparently naturalized and now permanent members of the Island flora.

67

Polster, D.F. and L.E. Watson VEGETATION CLASSIFICATION AND EVALUATION: ELK ISLAND NATIONAL PARK, CANADA. Techman Engineering Ltd., Calgary

The vegetation of Elk Island National Park, near Edmonton, Alberta was classified using the table method of Braun-Blanquet based on sampling of 138 releves. Ten differential species groups were used to define seven major naturally occurring vegetation types and one disturbed type. Within these types 13 sub-types have been defined. The vegetation classification and subsequent mapping have provided a basis for management decisions regarding wildlife and recreation uses of vegetation resources within the park. Assessments of successional relationships and interpretations for resource management scenarios have been made.

68

Rigney, L. P., M. E. Krasny, P. M. Frenzen PATTERNS OF VEGETATION AND SOIL DEVELOPMENT ON THE KAUTZ MUDFLOW, MT. RAINIER NATIONAL PARK, WASHINGTON. College of Forest Resources, University of Washington

Vegetation and soil surveys were conducted on the thirty-three year old debris flow surface at Kautz Creek. Sample points were located such that baseline vegetation and soil development studies conducted in 1950 could be repeated. Preliminary surveys revealed the existence of three distinct community types: areas of standing dead trees with mixed conifer communities, open areas dominated by moss cover, and intermediate areas characterized by mixed alder communities. Vegetation and soil samples taken in each community revealed between community differences and successional developments that have occurred subsequent to 1950.

69

Gill, S. J. BOTANICAL SURVEY OF CAPE FLATTERY AND OZETTE, OLYMPIC PENINSULA, WASHINGTON. Dept. of Botany, Washington State Univ., Pullman.

A botanical survey of Ozette/Makah territory was undertaken beginning in November, 1978, to document the types and availability of plant resources within this area. Although the climate of this region is mild and wet with only small variations of temperature and moisture, there occur several diverse habitats, each supporting a particular flora. Along the coastal slope the vegetation is typically dominated by Picea sitchensis and Polystichum munitum var. munitum, these being replaced by Tsuga heterophylla, Blechnum spicant, and a strong bryophyte component further inland. Many specialized habitats of limited area also occur: coastal dune areas, offshore islands, talis slopes, and "prairie" areas, each supporting a particular type of characteristic vegetation.

70

Alaback, Paul B. LONG TERM COMMUNITY STRUCTURAL CHANGES DURING SECONDARY SUCCESSION IN SOUTHEAST ALASKA. Department of Forest Science, Oregon State.

Sitka spruce-western hemlock forests originating from windthrow, logging, or fire display characteristic developmental patterns over time in southeast Alaska. The early stages follow the general description given for coastal Northwest sites. Understory biomass and production peaks 15-25 years after stand establishment. Vaccinium and Rubus shrubs dominate this phase. After forest canopy closure bryophytes increase cover and biomass for at least one century. At age 150-200 Vaccinium reestablishes developing a conspicuous layer. Beyond 200 years the highest structural diversity was attained. These older forests also had the most useable forage for ungulates. Departures from this developmental sequence were related to stand establishment history disturbance patterns, edaphic and microclimatic conditions.

71

Taylor, S. W. and M. A. M. Bell. A Comparative Study of Vegetation and Soils on Two Rock Formations in the Quesnel Highlands of British Columbia. University of Victoria

A correlation between vegetation and soil differences and rock type is suggested by a study of xeric forested hilltops in the Quesnel Highlands of B. C. underlain by two bedrock formations. The releve data is analysed with a computerized Braun-Blanquet table-sorting method. Of three plant communities found, two are largely restricted to the basic igneous formation, and one to the acidic formation. Chemical analyses of the B_f horizons of the mineral soil (B_{ir} in the U. S. system) show significantly higher exchangeable Ca, K, and Mg, higher total cation exchange capacity and base saturation in the soils on the basic formation.

72

Sauer, R. H., M. L. Warner, and W. T. Hinds. ECOLOGICAL CHARACTERISTICS IDENTIFIED FROM ALGORITHM STRUCTURE. Battelle, Pacific Northwest Laboratories.

Soil-plant relationships have been difficult to detail because soil removal disturbs the soil's capacity to function normally. This paper offers a technique for indirectly identifying such ecological characteristics as effective rooting depth and minimum soil water for production. Ecologic characteristics are illustrated by evaluating the correlations between production and different algorithms for calculating a seasonal sum of daily water status and temperature. This procedure was tested with data from three semi-arid communities. Results indicated soil water potential, not soil water percentage and $\log_e$ of soil temperature, not linear temperature, correlated best with production. The procedure also suggested an effective rooting depth of greater than 1 m and a permanent wilting potential of -20 to -50 bars. Limitations and applications of this procedure are discussed.

73

McKee, W. A., G. M. Hawk, J. F. Franklin and D. Zobel. HABITAT TYPE DIFFERENCES IN THE SEASONAL TREND OF FOLIAR NITROGEN CONCENTRATION. Oregon State Univ.

Temperature and moisture axes do not effectively separate many forest habitat types in the Oregon Cascades. Site fertility, as revealed by foliar nitrogen concentration was hypothesized as a possible third axis. Foliar nitrogen was sampled bi-weekly on five trees in four replicates of four habitat types from mid-April to early August. Five measures of comparison were tested to separate the habitat types. The best measure of comparison was the difference between current year's foliar nitrogen concentration two weeks after bud break. Other measures of comparison gave mixed results.

74

Research Natural Areas: A Resource Which Needs To Be Used
Sarah E. Greene, United States Forest Service

Research Natural Areas (RNAs) in the Pacific Northwest are set up for research and education, and to preserve gene pools. They are part of a federal system of natural areas administered by the Forest Service, Bureau of Land Management, National Park Service and U. S. Fish and Wildlife Service. Presently many new areas are being proposed within the current federal agencies planning efforts. Every ten years these areas will be reevaluated in the various agency land-use plans as to their highest value. Research Natural Areas are an invaluable tool for scientists and educators in the Pacific Northwest as they represent a wide array of aquatic and terrestrial ecosystems for scientific study. It is important to use these areas so as to justify their present status.

75

DeAngelis, J.D. EFFECTS OF SPIDER MITE FEEDING INJURY ON HOST PLANT CARBOHYDRATES.
Department of Entomology, Oregon State University

Mechanisms underlying physiological stress of Black Mitcham peppermint (*Mentha piperita* L.) induced by feeding injury by *Tetranychus urticae* Koch (Acari: Tetranychidae) have been investigated. Soluble leaf and transport carbohydrates have been examined with reference to the effects of mite injury.

Levels of soluble leaf carbohydrates increase with increasing feeding injury. This may be the result of an osmotic adjustment to low leaf water potential (ψ_l). Leaf fresh weight and water potential (psychrometrically determined) decline and leaf resistance (r_l) to water vapor diffusion increase with severity of feeding injury indicating water stress in affected leaves.

76

Marvel, S.C. Environmental Regulation of Growth and Dormancy in Lewisia rediviva Pursh (Portulacaceae). Botany Department, University of Montata, Missoula.

Controlled growth chamber experiments were used to investigate the environmental factors regulating the life cycle of the bitterroot, Lewisia rediviva Pursh, a cool steppe geophyte of the northwestern United States. Lewisia is dormant throughout the hot dry summer but resumes growth in the fall in response to a period of cold and/or moisture. It is the night rather than the day temperatures which are more critical in terminating summer dormancy and the dormant state can be maintained with day/night temperatures of 35/20 C. If plants are provided adequate water, the growth inhibition of high temperatures can be overcome. Induction of summer dormancy is primarily a long-day response but the bitterroot is not responsive to this photoperiod unless first vernalized. The vegetative life cycle of L. rediviva is thus regulated by natural predictable changes in temperature, light, and water

77

McShane, M. C. BLUEBUNCH WHEATGRASS PRODUCTIVITY: THE RELATIVE EFFECTS OF CLIPPING AND BURNING.
Battelle, Pacific Northwest Laboratory

The effect of removal of standing dead is not clearly understood for bluebunch wheatgrass (*Agropyron spicatum*). This study compares the response of dormant bluebunch wheatgrass plants to standing dead removal by burning or by clipping. To simulate differences in competition from surrounding vegetation, study plants were burned or clipped individually or as part of a circle with a 1 m radius from the study plant. Standing dead removal from dormant bluebunch wheatgrass clumps had a negative effect on vegetative performance regardless of the method of removal. Reproductive vogor was reduced by clipping but not by burning. Burned plants were more vegetatively and reproductively productive than clipped plants. The lack of differences between plants treated alone and plants treated as part of an area suggest that competition from nearby individuals has a insignificant role in regulating production. Other possible factors related to plant production are discussed.

78

Romo, James T., RESPONSE OF JUNEGRASS TO JAPANESE BROME AND KOCHIA COMPETITION.
University of Montana

The population dynamics and growth of Koeleria cristata (L.)Pers. grown in varying densities of Bromus japonicus (Thurb.) and Kochia scoparia Schrad. were studied. Competition did not affect the rate and number of emergent seedlings, seedling survival, or early growth of Koeleria. A time and competition interaction did reduce Koeleria's later growth. Koeleria seedling weights, determined at the end of the experiment, showed a species specific response. Seedling weights were reduced more by Kochia competition than Bromus; however, root-shoot ratios were greater in Bromus competition than in control or Kochia competition.

79

Eddleman, L. E. SEED GERMINATION IN ARTEMISIA TRIDENTATA WYOMINGENSIS Nutt.. School of Forestry, University of Montana

Seed phenology and germination were studied in southeastern Montana collections of Artemisia tridentata wyomingensis. Seed ripened in late October and early November. Over 90 percent of the seed were ripe by mid-November at which time seed shatter had begun. Germination under optimal conditions of 20°C was 83 percent and had peaked out by or prior to day six. Germination was depressed by low as well as high temperatures, by declining Ψ, and by seed age. Germination was depressed by light at low temperatures and promoted by light at high temperatures.

80

Brown, K. R. GERMINATION PATTERNS OF TAMARACK, LARIX LARICINA (DU ROI) K. KOCH Dept. of Botany & Plant Pathology, Oregon St.

Germination responses of tamarack, Larix laricina, seed from interior Alaska, Minnesota, Nova Scotia, and Quebec were compared under varying cold stratification, temperature, and photoperiod regimes. Seed from Minnesota and Nova Scotia germinated more rapidly at low temperatures (12°C and 15°C) than did seed from Alaska or Quebec. Seed from Alaska required light stimulation for germination at 12°C and 15°C. The influence of stratification period on germination rates appeared to decrease with increasing temperature of the germination treatment. Possible relationships of Larix germination patterns to latitude and macroclimate of respective seed sources will be discussed.

81

Klopsch, M. W. The Detection of Multiple Burns in the Age Structure of Mature Douglas-fir Stands. Oregon State University

Dominant trees in mature Douglas-fir stands often exhibit a broad range of ages. Many factors may be responsible for this phenomenon. One factor important in the central Oregon Cascades is multiple burns at a young age (20-40 years). The young scarred trees seldom survive to maturity and the dead wood decays quickly leaving little trace of fire when older scarred trees are not present. Clues to multiple burns are provided by age distributions, tree characteristics, density differences, burned wood, and boundary comparisons. Examples of reburned stands at different ages will be presented.

82

Beiley, P. and L. Scofield. An Ongoing Study of Iris tenax var. gormanii in the North Coast Range of Oregon and One Similar Location in the Cascades. U.S. Bureau of Land Management, Salem District.

Relevé analyses carried out for the past three years in populations of Iris tenax show correlations between new shading and a sudden percentage drop in flowering, between shading and a tendency to "skip a year" or remain dormant, between flat terrain and poor vigor and between extreme ground disturbance and subsequent success both in germinating and in maintaining vigor years later. I. tenax var. gormanii, a white or yellow-flowered variety of the usually blue-to-purple I.tenax, occurs as isolated individuals in populations of pale I.tenax. The claim that the varieties differ in sepal shape was disproved.

83

Kagan, J.S. BIOLOGY OF LOMATIUM BRADSHAWII (APIACEAE), A RARE PLANT OF OREGON

University of Oregon

Lomatium bradshawii is a rare, endemic plant which grows in wetland prairies of the Willamette Valley, Oregon. It has an unusual breeding system, with over 90% of the flowers produced being exclusively male, with hermaphroditic flowers occuring mainly on the second umbel of a plant. The plant is self compatable and most seed production is apparently the result of selfing, which may be a consequence of intense sexual selection to donate pollen. The plants have low fecundity, producing few fruits and having no known asexual reproduction. The age of first reproduction is probably delayed to decrease parental mortality. In L. bradshawii, restricted seed mobility, combining with a breeding system which involves extensive selfing, appears to leave the species with little genetic plasticity.

84

Pike, D.K. EFFECTS OF MOUNTAIN GOATS ON THREE PLANTS UNIQUE TO THE OLYMPIC MOUNTAINS, WASHINGTON. Univ. of Wash., Coll. of For. Res.

Mountain goats were introduced to the Olympic Mountains in the 1920's. Three endemic plants were studied which are utilized by the goats. Exclosures prevented goat grazing, allowing control and simulated grazing treatments. Grazed plants had reduced: leaf length, flower stalk length, and number of flowers than control trts. Grazed Aster individuals had greatly increased branching, indicating grazing tolerance. Grazed Senecio individuals had fewer leaves per ramet than ungrazed plants. Sexual reproduction is infrequent for all three species. They are long-lived perennials. Individuals have probably been eliminated from less stable microsites, but these three species are not immediately threatened with declining populations.

85

Wagner, D.H. TOLMIEA X TELLIMA, AN INTERGENERIC HYBRID. University of Oregon

A natural hybrid between Tolmiea menziesii and Tellima grandiflora has been discovered in Lane County, Oregon. A 1938 collection of this hybrid has also been identified from a review of herbarium material. Despite the presumed presence of twice as many chromosomes from Tolmiea, the superficial morphology of the hybrid more closely resembles Tellima. However, study of the details of floral structure of the hybrid reveals unexpected patterns, in that development involves a remarkable polymorphism in a single inflorescence and frequently produces structures unparalleled in either parent.

86

Edmonds, R. L., C. H. Driver and T. Jordan. THE INCIDENCE OF *FOMES ANNOSUS* IN PRECOMMERCIALLY THINNED AND UNTHINNED WESTERN HEMLOCK STANDS AT CLALLAM BAY, WASHINGTON. College of Forest Resources, University of Washington.

Fomes annosus potentially is a threat to the successful intensive management of western hemlock. Recent studies at Clallam Bay, Washington, have indicated that tree infection increased from 10% before precommercial thinning at age 15 to 90% after thinning at age 26. In unthinned stands infection increased from 10 to 60% in the same period. Average dbh of crop trees in the thinned stand was 28.1 cm in comparison to 23.5 cm in the unthinned stand. No advanced decay was observed in the trees, only incipient decay stain. The soda solubility (an index of decomposition) of stained wood was increased in comparison to clear wood but there was no significant difference in specific gravity.

87

Effects of Lauricidin and Ethylenediaminetetraacetic Acid (EDTA) on Growth of Several Hymenomycetous Fungi
C. Y. Li, Microbiologist, Forestry Sciences Lab
Paul E. Aho, Research Plant Pathologist, FSL

Growth of 9 hymenomycetous fungi was measured on media containing 10, 100, and 1000 ppm lauricidin with or without 0.1% EDTA. Lauricidin at 1000 ppm significantly retarded the growth of Coniophora puteana, Fomitopsis pinicola, Fomes officinalis, and Poria subacida. Additon of EDTA at this concentration of lauricidin significantly reduced the growth of the above fungi and Armillariella mellea, Echinodontium tinctorium, Phellinus pini, and Ganoderma tsugae, but not G. applanatum. Echinodontium tinctorium, F. officinalis, and P. subacida were completely inhibited. Studies are continuing to test the potential of these compounds as tree wound dressings.

88

Suttill, T.A. and J.W. Paden. PRELIMINARY STUDIES OF SIROCOCCUS STROBILINUS DEVELOPMENT IN LODGEPOLE PINE. University of Victoria.

Dark stressed Pinus contorta Dougl. seedlings were inoculated with Sirococcus strobilinus Preuss (Deuteromycotina) conidia to determine optimum levels of tissue soluble carbohydrates for disease development. Infection levels peaked after two days of complete darkness with a corresponding drop in soluble carbohydrate levels from 7.3% to 5.6%. In a second experiment S. strobilinus was not isolated from surface sterilized P. contorta seeds indicating the fungus is not seed-borne.

89

Robertson, A.S. & K.J. Stoszek. PRELIMINARY HAZARD RATING SYSTEM FOR WESTERN PINE-SHOOT BORER IN CENTRAL IDAHO. College of Forestry, Wildlife & Range Sciences, University of Idaho.

Models portraying the relationship between the percentage of leaders in young ponderosa pine plantations infested by Ecosma sonomona kft. and various site and stand characteristics are being developed. Preliminary results indicate that highest infestation rates are associated with plantations established on soils derived from granitic parent material and expressing rapid growth rates while rapidly growing plantations on basaltic soils had moderate infestation rates. Poorly growing plantations were rarely infested regardless of soil parent material.

90

Laursen, Steven B. and J. A. Moore. Effects of Larch Casebearer defoliation on growth and development of juvenile mixed-species larch stands. University of Idaho, Forestry.

A single-tree distance-dependent tree and stand growth simulation model (TASS, Mitchell, 1975) is parameterized to project the growth of western larch in Northern Idaho. This expanded model is further adapted to quantify the long-term effect of larch casebearer defoliation in terms of juvenile stand dynamics and volume yield impacts. Stand growth is projected subject to (1) continuously heavy defoliation by the larch casebearer, and (2) without defoliation. Results will provide revealing insights on how defoliation affects inter-specific competition, growth dynamics and yield in 10-40 year old larch stands with different stand structures.

91

Mastrogiuseppe, R. J. and N. T. Blair. THE ROLE AND USE OF PRESCRIBED FIRE TO CONTROL THE SPREAD OF TANSY RAGWORT, SENECIO JACOBAEA L. IN REDWOOD NATIONAL PARK CALIFORNIA.

The invasion of a disturbed coastal prairie by the noxious weed, Senecio jacobaea L. has been dramatic during recent years. Most control methods frequently used to combat its spread have the disadvantage that quantities of seed may be ripened and distributed by the plant following treatment. Fire prescriptions are being developed for prairie fuels, and general guidelines recommended. Resource management implications of control measures are discussed.

92

Crane, M. F. and J. R. Habeck. Early Post-fire Recovery within North-facing Ravine Douglas-fir Forests, Western Montana. Univ. of Montana, Msla.

Permanent transects are being monitored following a 1977 wildfire and aerial grass seeding. Some *Pseudotsuga menziesii, Larix occidentalis* and *Pinus ponderosa* survived the high intensity fire in moist ravines. In three years only a few tree seedlings have become established. Shrub and herbaceous species recovered rapidly from rootstocks, rhizomes, bulbs and corms; ravine recovery has been more rapid than on adjacent upland sites.

Moisture and fire severity appear to be the most influencial factors effecting recovery patterns and the competitive impact of the seeded exotic grasses. These grasses grew more vigorously and competed most strongly with native plants in the moist, severely burned ravine sites.

This report will summarize three growing seasons of recovery in the Pattee Canyon watershed near Missoula, Montana.

93

Landsberg, J. D. GRASS AND SEDGE PRODUCTION and R. E. Martin FOLLOWING PRESCRIBED FIRE USDA Forest Service, Silviculture Laboratory

Three months following prescribed burning the grass and sedge production was lower on areas treated with either a moderate fuel consumption (MFC) or a high fuel consumption (HFC) prescribed burn than on the control area in a ponderosa pine/bitterbrush/western needlegrass-bottlebrush squirreltail community. However, 15 months following the burns nearly all species of grass and sedge increased in production on the MFC area and exceeded that of the control while the HFC area production remained low. No Idaho fescue and very little bottlebrush squirreltail were found in the HFC area at three or 15 months.

94

Behan, M. J., University of Montana
THE SUITABILITY OF COMMERCIALLY AVAILABLE GRASSES FOR HIGH ELEVATION REVEGETATION

Subalpine areas disturbed by ski run construction and then seeded with grasses from two to twenty years ago were examined at six Montana ski areas. The species of grasses that had become established were compared with those reported to have been seeded as a means of expressing adaptability. Grasses that have persisted a decade or more were noted, as well as site characteristics such as forest habitat type, elevation, aspect, and soil parent material. The species with a record of establishment success and/or persistance in Montana have similarities and some differences with equivalent observations in mine wastes, ski areas, and roadsides at high elevations in Colorado.

95

Artificial and Natural Control of Medusahead Elymus caput-medusae L.

Dr. Carl Goebel and Mr. Mohammed Boukhnafer

The establishment of perennial native grasses is a critical phase in revegetating semi-arid rangelands. To aid the desirable grasses in competing with medusahead, individual or combinations of herbicides may be of value. Recent studies indicate that medusahead can be controlled at lower rates of application at pre-emergence and one-leaf stages. An alternate possible control is indicated by plots near Halfway, Oregon. Danthonia spp. appears to be invading protected scarified sites while Poa spp. have increased in shallow and rocky medusahead-infested range sites when protected from grazing.

96

Guevara-M, R., S. A. Guillen, and T. M. Maloney. PRELIMINARY STUDY OF PARTICLEBOARD MANUFACTURE USING *Pinus oocarpa* FROM HONDURAS.
University of Idaho and Washington State University

This was a preliminary study designed to determine the feasibility of using *Pinus oocarpa* as a raw material in particleboard manufacture. The wood raw material (logs) was collected from two geographic locations in Honduras. Then, ring-cut flakeboards were made in a factorial arrangement using 5 and 7 percent of urea-formaldehyde binder, and densities of 690 and 850 kg/m^3. Results show that the strength properties of these particleboards are much better than those required by the commercial standard for medium density particleboard. Linear expansion, water vapor adsorption and thickness swelling were consistently within the allowable range required for interior uses. No major problems were found during the manufacturing process.

97

Lawton, P.M. ENVIRONMENTAL RELATIONSHIPS OF SELECTED FOREST HABITAT TYPES IN NORTHERN UTAH. Univ. of Idaho, Forest Resources Dept.

Measured environmental gradients were compared to vegetation gradients in stands representative of six forest habitat types. Environmental variables considered were temperature, moisture, insolation, plant moisture stress, and soil characteristics. Vegetation gradients indicated by polar ordination correspond to complex temperature and moisture gradients. The habitat type classification was developed based on floristic analyses without direct consideration of environmental relationships. Both environmental and vegetational gradients were continuous but the classification was effective in stratifying the physical environment. Variability was greater between than within types, types did not overlap broadly, and types were significantly different for most environmental variables measured.

98

Topik, Christopher. FOREST FLOORS ALONG AN ELEVATIONAL TRANSECT OF THE OREGON WESTERN CASCADES. University of Oregon

Decomposition rates, as determined by litterbags and by forest floor standing crop and litterfall measurements, show an inverse relationship with elevation. The analysis of variance of the litterbag decomposition rates and similar results for microcosms in the lab allow determination of the relative roles played by climate, species of foliage, and the site of origin of the tested foliage. Results are discussed in reference to the general hypothesis which states that the recalcitrance of a species' foliage is an adaptation to the overall nutrient status of the site and that increased nutrient frugality and secondary compound production accompanies decreased site fertility.

99

Hinds, W. T., M. C. McShane, and J. R. Skalski LITTERFALL MONITORING IN FORESTS OF THE PACIFIC NORTHWEST. Pacific Northwest Laboratory, Richland

Standard litterfall collection techniques have not provided statistical precision sufficient to detect changes of the order of 10%. However, litter collection appears to be potentially adequate as a monitoring tool, if at least two specifications are met: 1) use total needle fall rather than total litterfall or species-specific needle fall; and 2) use a moderaly large number of small samplers, about 12 to 24 samples each 0.05 m^2 in area per hectare-sized plot. Data from this approach have exhibited a median coefficient of variation (S.E./$\bar{x}$) of 30% over an 18 month collection record, in three out of four plots in two western forest types.

100

Cline, Steven P., Phillip Sollins, and Thomas Verehoeven. DECOMPOSITION OF STUMPS AND LARGE WOODY ROOTS, WESTERN OREGON. Oregon St. Univ., Corvallis.

Physical and chemical changes of stumps and roots of Douglas-fir and western hemlock were studied within forests clearcut 3-35 yrs ago. Thirty-five yrs after Douglas-fir root death, decay was concentrated in sapwood; density had decreased 10-fold to 0.04 g cm^{-3}, moisture content had increased 5-fold to 250-350%, and N concentration had increased 5-fold to 0.45%. Hemlock roots decayed faster than Douglas-fir roots because of lower extractives content and wood density. Decomposition of Douglas-fir roots depended largely upon termite activity; fragmentation due to physical environment was less important in roots than in stumps, fallen boles, and snags.

101

Alaback, Paul B., M. Klopsch, and G. Koerper. THE ROLE OF DATA MANAGEMENT IN LONG TERM ECOLOGICAL STUDIES. Department of Forest Science, Oregon State.

Careful planning and attention to the details of data collection and storage are crucial to successfully addressing fundamental questions of ecosystem structure functioning, as well as fully exploiting the long term usefulness of these data. As our accumulation of information increases it becomes vitally important for researchers to fully utilize this information in initiating new research or in developing more efficient projects that compliment the extant ecological data. This data is especially valuable for estimating the variability in measured parameters for new projects. We are developing a hierarchical data set documentation structure for the Forest Science Data Bank so that the kind of measurements, sampling design, study locations, dates and researchers can be easily cross referenced, as well as efficiently accessed from magnetic tape storage. On-line files let the investigator determine relevent data sets and methodology quickly.

102

Taylor, R.J. ALLELOPATHIC EFFECTS OF SPRUCE BARK. Department of Biology, Western Washington University

Tannins and stilbenes were extracted from engelmann spruce bark and tested against a dicot (cabbage) and monocot (barley) to determine allelopathic effects. Under controlled laboratory conditions, stilbenes significantly inhibited seed germination and seedling growth of both cabbage and barley at concentrations equivalent to those of spruce forest soils. In combination with tannins, the inhibiting effect was further increased. Emerging and growing radicles and adventious roots were most sensitive to the allelopathic agents, contact with which resulted in protoplasmic disruption of meristematic cells. Preliminary results show similar inhibiting effects on seed germination and seedling growth of several conifer species.

103

Lawton, P.M. MODELING EARLY SUCCESSION FOLLOWING CLEARCUTTING AND BURNING. Univ. of Idaho, Forest Resources Dept.

The factors controlling successional development in the cedar-hemlock zone (Tsuga series) are not well understood. Considerations for modeling early seral succession as a multiple pathway process are discussed. A conceptual model is presented. The vegetational composition after disturbance is a probabilistic function of contribution from on-site and off-site vegetation, establishment, growth rates, and survival and replacement. The shrub response to burning treatment should be predictable from the model if site characteristics, pretreatment stand condition, and burning conditions are known. Such information would be useful to resource managers as shrubs compete with conifer regeneration and provide critical big-game browse.

104

Martin, R. E. ROLE OF NATURAL FIRE PERIODICITY IN SUCCESSION
USDA Forest Service, Silviculture Laboratory

Succession has been affected greatly by natural fire periodicity, which in turn was dependent upon the amount and type of vegetation, seasonal length of fire susceptibility, and lightning and Indians as ignition sources. Period between fires was lowest in low elevation pine sites and the shrub grass lands adjacent to them, and increased toward the drier and wetter types lower or higher on the landscape. The low periodicity of 5 to 15 years generally moved succession very little and could hold succession at any stage. Longer periods between fires generally moved succession from the climax to pioneer stages.

105

Armour, C.D. and L.F. Neuenschwander. FUEL ACCUMULATION IN RELATION TO STAND HISTORY. Univ. of Idaho, Forest Resources Dept.

Predicting fuel loadings by habitat type, stand composition, or stand age has not been successful (Brown, 1980-Review Draft). However preliminary data on fuel accumulation resulting from mountain pine beetle mortality in the Pseudotsuga menziesii/Calamagrostis rubescens habitat type indicate that downed woody fuel loadings are predictable and correlated to habitat type, stand age, stand composition, and stand history. Downed woody fuel increased from 20.84 m tons/ha in recently attacked stands to 174.52 m tons/ha in timber infested 25 years ago, but decreased to 51.54 m tons/ha and 11.91 m tons/ha in stands of lodgepole pine killed 80 years ago and in climax stands respectively.

106

Vietnieks,K.A. A MICROSITE APPROACH TO ASSESSING LODGEPOLE PINE REGENERATION ON SCARIFIED CUTOVER IN THE B.C. INTERIOR. Univ. of B.C.

Field investigations of natural lodgepole pine regeneration included seedling tallies by plot and descriptions of the local environment. Factors assessed through statistical testing included scarification treatment, aspect, slope, slash and vegetative cover, number of cones by plot, and site positions on the edatopic grid. Seedbed conditions were described, four classes defined, and variation in ratio of seedlings to seedbed area and number of cones was tested. Aspect and site moisture were the only factors tested significant for the main cutover, and only for seedbeds of undisturbed forest floor duff. It is concluded that north-facing slopes in this cutover are most adverse to seedling establishment.

107

Ross, J. A. CONTROLLED BURNING: FOREST MANAGEMENT IN THE ABORIGINAL COLUMBIA PLATEAU. Eastern Washington University

Controlled burning was practiced by indigenous people to effect change in selected resource areas of differential economic importance. Areas were burned once a year, modifying the understory to encourage grazing animals, eliminate windfall and deadfall for better visibility in predation and ease of travel, control competition between certain plant species, and reduce hazards of lightning fires. Certain males possessing religious power were responsible for the condition of these local environments that were exploited for floral and faunal resources. Controlled burning continued until the establishment of reservations. Burning was practiced until the late 1920's when Indians were sentenced to jail for continuing this environmental stewardship.

108

Littke, W., R. L. Edmonds and C.S. Bledsoe. EFFECTS OF NH_4^+ AND NO_3^- ON GROWTH OF A MYCORRHIZAL FUNGUS, *Hebeloma crustuliniforme*. Forest Resources, U-W, Seattle, WA.

Mycorrhizae can increase phosphorus acquisition by forest trees, but their importance in nitrogen uptake is less well known. In this study, a common mycorrhizal associate of Douglas-fir, *Hebeloma crustuliniforme*, was grown in pure culture. Melin-Norkrans modified media (MMN) was used to assess the effects of N concentration and N form on nitrogen utilization. Radial growth was measured on solid media, and dry matter production was determined in liquid culture.

Hebeloma grew radially more slowly than most other mycorrhizal fungi tested. Low ammonium or nitrate levels increased radial hyphal extension and decreased lateral branching. In contrast to radial growth, biomass production by *Hebeloma* was greater than that of species with higher radial growth rates. In liquid culture, ammonium was utilized in preference to nitrate by the fungus.

109

Bledsoe, C. S., K. Tennyson, and W. Lopushinsky. SEEDLING SURVIVAL OF OUTPLANTED MYCORRHIZAL DOUGLAS-FIR. College of Forest Resources, Univ. Washington and PNW Forestry Sciences Lab., Wenatchee, Wash.

Although mycorrhizae have enhanced survival of conifer seedlings in the southeastern U.S., research results in the N.W. are equivocal. In this project 2-0 eastside Douglas-fir seedlings were outplanted on two burned sites in N-central Wash. Trees were either uninoculated controls or inoculated with mycorrhizal fungi (either Hebeloma crustuliniforme or Laccaria laccata). Survival on one site was 99% for all treatments; on the second site, survival was 62%, 71% and 76% for controls, Hebeloma and Laccaria, respectively. On this second site, biomass of controls was greater than that of either mycorrhizal treatment. However, plot volume index, another estimate of seedling performance, was greater for all mycorrhizal treatments on both sites, suggesting that mycorrhizae increased survival. All newly developed roots rapidly became mycorrhizal, which would minimize subsequent effects of the initial inoculation.

110

Otto, P. C. and J. R. Boyle. THE EFFECTS OF SEWAGE EFFLUENT ON *ACER* MYCORRHIZAE. College of Forest Resources, University of Washington.

Secondarily-treated sewage effluent was sprayed onto a 50-year-old hardwood stand in Harbor Spring, Michigan. Effluent was applied at rates of 0.0, 3.8, and 7.6 cm per week onto thinned and unthinned experimental plots during the growing seasons of 1978 and 1979. Each spray level and density combination was replicated 4 times.

Mycorrhizal development of *Acer* sp. roots was examined during 6 months over a two-year period in these irrigation and control plots and was significantly greater on the sprayed than on the unsprayed plots ($p < 0.05$). Development did not vary significantly ($p < 0.05$) with season or thinning.

111

Binkley, Dan. NITROGEN FIXATION AND NET PRIMARY PRODUCTION IN A YOUNG SITKA ALDER ECOSYSTEM. MacMillan Bloedel Ltd., Nanaimo, B.C.

Biomass, net primary production and nitrogen fixation rates were measured in a 5-yr-old Sitka alder [Alnus sinuata (Regel) Rydb.] ecosystem. Acetylene reduction assays yielded a nitrogen fixation estimate of 35 kg ha^{-1} yr^{-1}. The biomass of leaves, stems, roots and nodules was 13,720 kg ha^{-1} and aboveground net primary production was 6,000 kg ha^{-1} yr^{-1}. This species appears to have considerable potential for providing biologically fixed nitrogen in mixed plantations with commercially valuable conifers.

112

Harrington, Constance A., and Robert L. Deal. SITKA ALDER AND DOUGLAS-FIR MIXTURES LOOK PROMISING. USDA For. Serv., PNW For. & Range Exp. Sth., Olympia, Wash.

Sitka alder is a native shrub that has been proposed for seeding or planting in Douglas-fir stands to serve as a nitrogen source for the crop trees. Sitka alder fixes atmospheric nitrogen yet has low total height and a fairly early slow down in height growth; thus it could benefit Douglas-fir without offering major competition. Juvenile height growth of Sitka alder was determined on eight sites in western Washington. Height growth was variable but generally decreased with increasing elevation. Sitka alder and Douglas-fir early-age height growth curves were compared. Based on the authors' criteria, Sitka alder/Douglas-fir mixtures appear to be compatible. On the poorest Douglas-fir sites, however, Douglas-fir should be given a head start to reduce the risk of suppression. Field trials should be conducted to determine the optimum management regimes for such species mixtures.

113

Binkley, Dan and K. Cromack, Jr. NITROGEN ACCRETION AND AVAILABILITY IN SNOWBRUSH ECOSYSTEMS. Oregon State University.

We examined two chronosequences of ecosystems in the Oregon Cascades to assess nitrogen accretion and availability in relation to snowbrush (Ceanothus velutinus Dougl.) At 12 yr of age, total soil nitrogen (to 30 cm) in the snowbrush ecosystems exceeded levels in adjacent old-growth stands by 500 to 570 kg/ha. Inclusion of the approximate nitrogen content of aboveground snowbrush biomass raised the nitrogen fixation estimate to 75 to 80 kg/ha·yr for 12 yr. Snowbrush also increased nitrogen availability, but nitrogen did not appear limiting at any stage of the chronosequences. We speculate that nitrogen fixation by snowbrush during early successional development of these ecosystems historically has been sufficient to prevent nitrogen limitations through the entire chronosequence.

114

Sugihara, N. G. Large Scale Inoculations of Red Alder Nursery Stock with N-fixing Actinomycetes - Redwood National Park

Background-Containerized Red Alder nursery stock grown in Greenhouses using sterilized potting mix were lacking N-fixing root nodules at outplanting.

Tests showed a twelve fold top growth increase in the first season after inoculation. A simple technique for inoculation of large quantities was developed and used on 50,000 seedlings being grown for erosion control. Growth response was noticed 5-7 weeks after inoculation of soil in containers. Uniformity, caliper and top height were improved by the time of planting. Significant increase in initial growth and survival is expected.

115

Monaco, P.A., K. K. Ching, T. M. Ching BIOMASS PRODUCTION AND NITROGEN ASSIMILATION CAPACITY OF ALNUS RUBRA SEEDLINGS. Oregon State University

Half-sib progeny from three selected Alnus rubra parent trees were tested for biomass production and nitrogen assimilation capacity. Each family was tested by growing the seedlings in a common environment in the greenhouse for 16 weeks with three different inoculum treatments. Data was analyzed using Principle Component Analysis, ANOVA and linear correlation. There were significant family differences and there was a major difference amongst the 14 dependent variables due to one inoculum. Leaf area correlated highly with total biomass and nitrogen, shoot length, and acetylene reduction rates.

116

ADAPTABILITY OF EUCALYPTUS SPECIES IN SOUTHWEST OREGON
Lee O. Hunt, Owner - Fir Springs Tree Farm

Shortages of both fossil fuels and wood supplies have stimulated interest in Eucalypts as a high yielding crop produced in a short rotation. Recent studies indicate that some species are more cost effective as fuel than oil, gas or native oak.
Due to lack of cold tolerance of most Eucalyptus species their planting in Oregon has been viewed with considerable skepticism.

This study reports about a decade of screening a number of Eucalyptus species for cold resistance. Seed sources were from various elevations in Australia.

Results indicate that only four of the twenty species tested will survive east of the coast range. Several species have survived and shown remarkable early growth on the coastal strip

117

El-Kassaby, Y.A. and O. Sziklai.
Genetic variation of isozyme and quantitative traits in a selected Douglas-fir population.

Genetic variation at 27 loci was studied in a Douglas-fir stand with respect to four elevational transects. The average proportion of polymorphic loci per elevation class was .54+.06 and the average proportion of heterozygous loci was .17+.02. The data yielded the following generalization: a-the amount of genetic polymorphism varied considerably between loci; b-similarity between the different elevational classes was observed in the amount and pattern of genetic variation for most loci; c-however, some loci had large differences among classes. Inter-elevational differentiation amounted to 7% while the remaining 93% resided within the elevational classes. Good agreement between the isozyme data and the quantitative information which was collected from half-sib families of the same trees was observed. Analysis of variances for seven seedling traits studied gave the same general trend and variation between the different elevational classes varied between 0.0 and 6%.

118

Mikola, J. FACTORS AFFECTING THE CLONAL COMPOSITION OF CONE CROPS IN DOUGLAS-FIR SEED ORCHARDS
Forest Research Laboratory, Oregon State University

Flowering patterns in clonal seed orchards of Douglas-fir were investigated. In young orchards (6 and 12 years old), about one-half of the female flowers were found in ramets that eventually died due to graft incompatibility. However, among compatible ramets, a few clones dominated the flowering and a large proportion of clones produced no flowers at all. As ramets became older, the number of clones flowering increased rapidly, but unbalance in flower production remained large. Even in orchards grafted 15-20 years previously, more than 50 percent of the flower crop was produced by less than 25 percent of the clones. Relative differences among clones in mean flower production per ramet has diminished with age in these orchards. Nevertheless, differential loss of ramets due to incompatibility ensures that large clonal inequality in flower production will remain.

119

Harrington, Constance A., and Donald L. Reukema. DOUGLAS-FIR TREES RESPOND WELL ON POOR-QUALITY SITE WHEN GIVEN AMPLE SPACE. USDA For. Serv., PNW For. & Range Exp. Stn., Olympia, Wash.

A 27-year-old, site V, Douglas-fir plantation was thinned from 2.4-m spacing to spacings ranging from 3.4 to 8.1 m. Immediate effect of thinning was "thinning shock" that is, reduced height growth, delayed diameter growth, and increased mortality. After 25 years, however, the long-term effects of increased spacing have been surprisingly beneficial. During the last 10 years, diameter growth at the 6-m spacing has been twice as fast as at the 3.4-m spacing--0.60 vs. 0.30 cm/yr. Height growth has been increased too--49.6 vs. 22.0 cm/yr. In the last 5 years, volume growth per hectare at the 6-m spacing was 75 percent of that at the 3.4-m spacing, with only 32 percent as many trees. Growth rates of individual trees are expected to continue to diverge with increased spacing; correspondingly, growth rates per hectare are expected to converge over time.

120

McCreary, D. D. and David A. Perry. COMPARING STRIP THINNING AND CONVENTIONAL THINNING
Oregon State University

Growth response of trees was compared after strip thinning, conventional selective thinning, and no thinning in a 35-year-old Douglas-fir stand. The ratio of basal area growth five years after thinning to basal area growth five years before thinning was larger for all thinning treatments than for the control; however, trees farther than 3 m from the edges of strip-thinned plots showed no thinning response. Both individual tree growth and net stand yield were greater in conventionally thinned than strip-thinned plots when similar percentages of initial stand basal area were removed in each; net stand yield after five years was greater even when 20-percent more trees were removed by conventional thinning. Nevertheless, lower logging costs and increased silvicultural flexibility may make strip thinning a desirable alternative in some cases.

121

Reukema, Donald L. INFLUENCE OF THINNING ON SEED PRODUCTION IN A YOUNG DOUGLAS-FIR STAND. USDA For. Serv., PNW For. & Range Exp. Stn., Olympia, Wash.

Seedfall was sampled from ages 39 to 68 in thinned and unthinned portions of a Douglas-fir stand in the foothills northwest of Mt. Rainier, Washington. Annual production of filled seed varied from none to more than 1.5 million seeds per hectare. Crops of more than 100,000 filled seeds per hectare were produced seven times in all stands and nine times in thinned stands. Thinning generally had no effect on the amount of seed produced in poor seed years, but it substantially increased seed production in some of the better years. The beneficial effect of past thinning did not last, however, even though stocking levels remained much lower in thinned than in unthinned stands.

122

Scanlin, D., and J.R. Olson. RESPONSE OF INLAND GRAND FIR AND DOUGLAS-FIR STAND TYPES TO NITROGEN FERTILIZATION AND THINNING. University of Idaho, Potlatch Corporation.

The effects of applying 200 lbs./acre of urea nitrogen to thinned and unthinned Douglas-fir and grand fir stands within the Inland Empire Region were evaluated on 33 sites. Nitrogen fertilizer response in unthinned stands averaged 22 cubic ft./ac./yr. and 42 cubic ft./ac./yr. for Douglas-fir and grand fir stand types, respectively, over an 8-year post-treatment period. Analysis at 4 and 8 years following treatment indicates that grand fir stand types have a higher probability of meeting a specified minimum response than do similarly treated Douglas-fir stands. In thinned stands, for both stand types studied, growth on fertilized residual trees was significantly greater than that of similarly thinned but unfertilized trees.

123

Schmidt, W.C. Development of young western larch under regulated stand densities. INT For. & Range Exp. Stn., USFS, Bozeman, Mont.

This report describes the 10-year effect of regulated stand density and shrub competition on teenage western larch in Montana. Crowns, stem diameters, heights, phenology, and mortality were evaluated. Crowns and stem diameters of this intolerant species were very sensitive to stand density, but height growth of crop trees was about the same on all densities, except in the heavily stocked, unthinned stands. Dense stands produced the most basal area, volume, and mortality. Phenological timing was little affected by stand density. The removal of large shrubs had no significant effect on tree development.

124

Crawford, R.C. RESPONSE OF TAXUS BREVIFOLIA Nutt. (PACIFIC YEW) FOLLOWING TIMBER HARVESTING - University of Idaho, College of Forestry, Wildlife and Range Sciences

Throughout most of its range Taxus brevifolia grow under dense forest canopies as scattered shrubs or small trees. In the South Fork of the Clearwater River drainage of Idaho, T. brevifolia grows in extensive stands sharing cover dominance with Abies grandis. In an area where timber harvesting is a major consideration, conflicts arise because yew stands provide critical winter cover and forage for local moose populations. This paper reports the first year results of the effect of an experimental timber harvest on plant mortality and current twig production of T. brevifolia. Preliminary results indicate that with overstory removal twig production decreases and twig growth tends to be redistributed from the branches to the trunk.

125

Kelpsas, B. R. and M. Newton PLANT COMMUNITY CHANGES AND STOCK TYPE PERFORMANCE FOLLOWING BRUSHFIELD CONVERSION IN THE OREGON COAST RANGE Oregon State University

Plant community characteristics were evaluated before and after four brushfield site preparation methods were applied to a coastal hardwood-brush type. Treatments employed were tractor scarification, burning or tractor crushing preceded by an application of 2,4,5-T and picloram, and an application of glyphosate. All were applied to 10-acre plots following a salvage logging operation. Seedlings of four conifer species representing four stock types were planted in each treatment area after site preparation, and survival and growth recorded.

All treatments were successful in reducing heavy shrub and tree cover to near-zero levels. Most herb and woody species present in the original brush community were present in each treatment area, but shrub mortality differed between methods. Conifer seedling performance also varied between treatment, stock type and species.

126

Conard, S. G. A CONCEPTUAL MODEL OF THE INFLUENCES OF ENVIRONMENT AND SPECIES CHARACTERISTICS ON GLYPHOSATE INJURY Oregon State University

The effects of environment on glyphosate absorption, translocation, and injury vary among species. Inconsistent responses to glyphosate have been observed for many woody species and are difficult to explain. The influences of temperature, humidity, and plant moisture stress (PMS) at or following glyphosate application should be a function of internal resistances to glyphosate transfer from phloem to xylem (r_{px}) and stomatal responses to moisture stress, both of which vary among species. Conditions which favor high stomatal resistance and low resistance to glyphosate absorption, as well as low r_{px} should be correlated with increased herbicide injury, as long as application is made when phloem translocation to the roots is high. Therefore, characteristics of individual species may help to predict effects of environmental conditions on glyphosate injury. Data from the literature supports the potential usefulness of the model.

127

Breuer, D.W. COMPARISON OF COMPACTION AND DISTURBANCE OF VOLCANIC ASH SOIL RESULTING FROM HARVEST WITH FOUR TYPES OF GROUND SKIDDERS. Potlatch Corp., Lewiston, Idaho

Soil compaction and disturbance resulting from harvest operations on volcanic ash soil in Northern Idaho was examined. Four types of skidding machines were compared -- large crawler tractor, small crawler tractor, rubber-tired skidder, and FMC floating track skidder. To evaluate compaction, soil density was measured at 200 relocatable points per machine before and after ground skidding. Soil disturbance was estimated at 250 points over approximately 20 acres before and after skidding with each machine. The relationship between intensity of skid trail use and soil densification was studied.

Compaction of the ash soil was lower than has been reported for other forest soils, and little difference in the amount of compaction produced by these four machines was observed.

128

Tesch, S.D., H.R. Zuuring, and J. L. Faurot. PREDICTING PONDEROSA PINE PLANTATION YIELDS USING UNMANAGED STAND DATA. School of Forestry, Univ. of Montana

Methodology was developed to predict the yield of intensively-managed ponderosa pine plantations in western Montana, using nonpermanent plot data collected in unmanaged stands. The initial spacing of individual dominant trees in unmanaged stands was estimated as a function of the trees' past radial growth rates and diameters, and the size and spatial distribution of the trees' nearest neighbors. Nonlinear regression techniques were used to predict individual tree d.b.h. and volume, and current density, each as a function of plantation age, initial density, and site index. Individual tree volume and current density estimates were multiplied to obtain estimates of yield. Predicted yields compare favorably with published ponderosa pine yield tables.

129

HALL, DALE O. WINNOW: AN ALL-AGED STAND PRESCRIPTION - MANAGEMENT FRAMEWORK INTERMOUNTAIN FOR. AND RANGE EXP. STATION

SELECTING THE 'BEST' STAND MANAGEMENT REGIME FROM AMONG THE POSSIBLE COMBINATIONS OF FIVE PRESCRIPTION ELEMENTS REQUIRES CONSIDERABLE WINNOWING. THE FIVE ELEMENTS CONSIDERED ARE: SPECIES COMPOSITION, STAND STRUCTURE, DENSITY, MAXIMUM TREE SIZE AND CUTTING CYCLE. WINNOW WORKS WITH THE GROWTH PROGNOSIS SIMULATOR (GPS) AND ECONOMIC ANALYSIS MODULE CHEAPO TO EFFICIENTLY HANDLE THE MANY PROJECTIONS. WINNOW CONSISTS OF A GROUP OF ADP PROGRAMS AND A CALCULATION AND DECISION FORMAT. PHYSICAL AND ECONOMIC PRODUCTIVITY IS TABULATED AND WINNOWED THROUGH THE LANDOWNER'S OBJECTIVES AND CONSTRAINTS. TRADEOFFS BETWEEN ALTERNATIVE DECISIONS ARE EVIDENT.

130

SOILS, VEGETATION, AND FOREST REGENERATION ON TWO ADJACENT PARENT MATERIALS IN SOUTHWESTERN OREGON

Don Minore and Kevin A. Short

Differences in vegetation and forest regeneration in two adjacent areas east of Sutherlin, Oregon are related to the pillow basalt and sandstone parent materials on which they occur. The soils over pillow basalt are higher in pH, nitrogen, calcium, magnesium, cation exchange capacity, and adenylate (ADP + ATP) levels than the soils over sandstone. Poison oak-and grass-cover percentages are also higher on the basalt, but forest regeneration after clearcutting is much poorer there than on the sandstone parent material.

131

Meier, C. E. and C. C. Grier. ABOVE-AND BELOWGROUND N AND P REQUIREMENT AND UPTAKE IN IMMATURE AND MATURE *ABIES AMABILIS* SYSTEMS, FINDLEY LAKE RESEARCH SITE. College of Forest Resources, University of Washington.

Above-and belowground (root) N and P cycles were compared in 23-and 180-year-old *Abies amabilis* systems growing at 1130 m elevation in the western Washington Cascades. Differences in above-and belowground plant N and P requirement and uptake; and differences between systems with respect to the above components were determined. Belowground N and P requirements and uptakes were 2.5 - 3.5 times greater than the aboveground component. Requirement and uptake dominance of the belowground system component was more accentuated in the mature system. Results are explained by differences in system component above-and belowground NPP and internal nutrient redistribution.

132

Respond of Western Hemlock to Phosphorus Fertilization
R.J. Zasoski and S.P. Gessel

Western hemlock (Tsuga heterophylla [Raf] Sarg) seedlings growing in Copalis soil in coastal Washington exhibited a significant response to added phosphorus. These seedlings were fertilized with various forms of nitrogen and nitrogen-phosphorus combinations. There was no detectable response to any form of added nitrogen without added phosphorus. Height increment in the phosphorus plus nitrogen treatment was twice that in the nitrogen alone or control treatments. Numerous greenhouse studies have demonstrated phosphorus responses in coastal soils. These data and results from this study suggest that phosphorus fertilization may be profitable in coastal hemlock forest areas. Data on chemical analysis of hemlock under the various treatments is presented.

133

Black, R.A. FLOODING RESPONSES OF MATURE AND SEEDLING QUERCUS PALUSTRIS IN A FLOOD PLAIN FOREST. Dept. of Forestry & Range Mgt., Wash. St. Univ., Pullman,WA

Comparative physiological data are presented for the flooding responses of tree and seedling Quercus palustris from the Mississippi flood plain forest of Missouri. Water relations and phenology were investigated for natural and experimental flooding treatment. Mature trees (20 m tall) revealed no difference in seasonal and diurnal measurements of stomatal resistancy, xylum tensions and leaf water potential when subjected to dormant season flooding. Growing season flooding caused immediate stomatal closure followed by partial recovery within 10 days. The stomatal closure was not related to leaf water stress. Leaf senescence in growing season flooded trees was ca 2 weeks earlier than controls. Seedling responses to dormant season flooding were similar, but unlike mature trees, no recovery from growing season flooding was found. Diurnal patterns of water relations were found similar to upland oak species except no evidence of summer drought was found.

134

Walker, Richard B., Ellen C. S. Duffield and William Lopushinsky. ROOT PRESSURE IN ABIES SEEDLINGS.
Botany Dept., University of Washington, and U.S.F.S. Hydrology Laboratory, Wenatchee.

The exceptional amounts of root pressure exudate produced by 2-year old conifer seedlings which were potted then stored in a dark cold room for 3 months was reported by one of us (W. Lopushinsky, Forest Sci. 26:275-279,1980). Using similarly treated seedlings of grand fir(Abies grandis) and noble fir(A. procera), root pressures were determined. Nineteen grand fir seedlings developed root pressures ranging from 7 to 152 cm of water(Ave.56 cm), and the two noble firs tested showed 36 and 165 cm. Irrigation with abscisic acid solution(2 mg mixed isomer per liter) appeared to stimulate root pressure. Implications for mineral nutrition and water relations of the plants will be discussed.

135

Reaves, J. L. THE EFFECTS OF ASH ON THE GROWTH OF ARMILLARIA MELLEA
USDA Forest Service, Silviculture Laboratory

Mycelial plugs and aerial rhizomorph tips of A. mellea were inoculated on media amended with ash and ash leachates. Rhizomorphs were measured after six days of growth and at three day intervals thereafter. Dry weight determinations were made at the termination of the experiments. Rhizomorph initiation was usually four to six days in all ash concentrations except the 10 g/l. Dry weight of rhizomorphs initiated from mycelial plugs was also reduced on the 10 g/l of ash. Morphological features such as mycelial fans and lobed-shaped aerial rhizomorphs were apparent on ash and ash leachated media.

136

Potential Effect of Mt. St. Helens' Ash on Forest Growth
John Bethel, S.P. Gessel, R.J. Zasoski and R. Edmonds

The 1980 eruptions of Mt. St. Helens distributed significant amounts of volcanic ash over large forested areas of western Washington. In this study the total ash input and the internal distribution of ash were examined on 15 pre-established plots in the Regional Forest Fertilizer Project. Ash thickness and weight per unit area were determined, and some information on the vertical distribution of ash retained on vegetation was collected. Continuing measurements of tree growth will permit a qualitative assessment of the effects of this ashfall on forest productivity.

137

Radwan, M.A., and D.L. Campbell. CHEMICAL PROPERTIES OF SOME ASH AND MUD FROM THE 1980 VOLCANIC ERUPTION OF MOUNT ST. HELENS. USDA For. Serv.,PNW For. & Range Exp. Stn., & USDI Fish & Wildl. Serv., Olympia, WA.

Samples of ash were collected near Olympia, in Capitol State Forest 10 mi. west of Olympia, and near Toutle 20 mi. west of Mount St. Helens, Washington. For comparison, samples of volcanic mud and mineral soil were also obtained from the Toutle River and Toutle, respectively. Samples were analyzed to determine pH; cation exchange capacity; exchangeable Ca, Mg, and K; extractable Fe, Mn, Zn, and Cu; total S; sulfate-S; total N; ammonium-N; nitrate-N; and available P. In general, the ash and mud were slightly acidic. Compared to Toutle soil, the ash and mud were higher in available P, total S, sulfate-S, extractable Cu and Mn, and exchangeable K. Ash and mud, however, were much lower than the soil in cation exchange capacity, total N, exchangeable Mg, and extractable Fe. Results indicate that frequent fertilization, especially with N, would be necessary for normal plant growth in Mount St. Helens ash or mud similar to the samples used here.

138

Campbell, D.L., and M.A. Radwan. SEED GERMINATION AND SEEDLING ESTABLISHMENT OF TREE AND BROWSE SPECIES IN SOME ASH AND MUD FROM MOUNT ST. HELENS. USDI Fish & Wildl. Serv., and USDA For. Serv., Olympia, WA.

Ash, volcanic mud, and mineral soil were collected near Toutle, 20 mi. west of Mount St. Helens, Washington. Plant species tested included Douglas-fir (Pseudotsuga menziesii), west. hemlock (Tsuga heterophylla), west. redcedar (Thuja plicata), lodgepole pine (Pinus contorta), red alder (Alnus rubra), catsear (Hypochoeris radicata), redstem fireweed (Epilobium watsonii), dwarf English trefoil (Lotus corniculatus arvensis), and orchard grass (Dactylis glomerata). Germination was run on wet filter paper with and without ash. Seeds were also sown in pots on ash, mud, ash on top of soil, and soil. Germination in ash was somewhat delayed but there was no effect on final germination. Establishment in pots was best in soil and worst in ash on top of soil. Performance was best with pine, catsear, and trefoil and worst with alder and fireweed. Growth of all plants was improved with fertilization. Species which performed best may be useful in rehabilitation work.

139

Pond, S. and O. Sziklai, Application of two-way Thermogradient Plate for Lodgepole pine germination. Faculty of Forestry, U.B.C.

Six provenances of Pinus contorta var. latifolia, ranging 10° N latitude, from northern British Columbia and the southern Yukon Territories were tested using the two-way thermogradient germinator. Temperature varied between 10°C and 30°C in a 12 hour dark and light photoperiod cycle. The results of the germination percent and the rate of germination will be discussed.

140

McCreary, D. D. and D. P. Lavender. GERMINATION AND GROWTH OF DOUGLAS-FIR SEEDS AS AFFECTED BY THE PROXIMITY OF PARENT TREES TO HIGH VOLTAGE POWER LINES
Oregon State University

The effects of electricity on the growth of plants have been investigated for more than 100 years. Most of this research has dealt with attempts to increase yields in horticultural crops. Recent interest has centered on possible adverse effects on living organisms of strong electric fields generated by high voltage power lines. We conducted an experiment to determine if seeds from Douglas-fir trees located near an 1100 kV prototype transmission line were measurably affected. Results indicated that the proximity of parent trees to the lines was not related to either seed germination or the growth or survival of the germinated seedlings.

141

Folsom, M. M., AMPHITHEATER-HEADED VALLEYS OF HAWAII: AN EXPLANATORY MODEL, Eastern Washington University

Many Hawaiian valleys have unusual morphology with upper reaches forming broad, cirque-like basins that narrow distinctly downslope. These amphitheater-headed valleys result from close vertical juxtaposition of humid and arid climates. Elevations below 365 meters have strong, persistent soil-moisture deficits, thin soils, and angular, structurally-dominated slopes. Elevations between 500 and 1250 meters have a persistent soil-moisture surplus with deep soils which erode by mass-wasting and colluviation into steep, erosionally-dominated slopes. Above about 1350 meters aridity increases. The amphitheater-like valleys result from very active humid-erosional processes sandwiched between arid processes both upslope and down.

142

Bjork, J.T., DEPOSITIONAL ENVIRONMENT OF SOME UNUSUAL QUATERNARY SEDIMENTS NEAR SPOKANE, WASHINGTON, Department of Geology, University of Idaho, Moscow, ID 83843

Sedimentologic, stratigraphic, and petrologic analyses of late Pleistocene sediments along Latah Creek in southwestern Spokane, Washington, has revealed rhythmically bedded sands and gravels often separated by clay and silt varves. The sand and gravel cycles suggest repeated floodings of dense sediment laden currents into an ice-marginal lake in the lowlands south of Spokane. Floodwaters were derived either from catastrophic failure of glacial lakes, and/or discharges of glacial meltwater. The interbedded varves demonstrate floodings occurred with a frequency of every 10 to 30 years; palynological examination of the varved sediments indicates a tundra-like environment. A broad cut-and-fill of sand, and fine Touchet-like silt locally overlies the cyclic sediments.

143

Kiver, Eugene P., and Stradling, Dale F., CATASTROPHIC FLOOD DEPOSITS FROM LAKE MISSOULA IN THE SPOKANE AREA
Eastern Washington University

Quaternary sediments in the Spokane Valley east of Spokane are interpreted as Lake Missoula flood deposits rather than kames or outwash as previously proposed. They are associated with eddy and pendant bars similar to those of unquestioned flood origin in the nearby Channeled Scablands. In addition to the Rathdrum-Spokane Valley flood pathway, channels located between the Pend Oreille Valley and the Little Spokane River Basin provided major routes into the Spokane area for late Pleistocene floodwaters.

Flood deposits separated by varved sediments indicate at least 12 floods during the late Pleistocene. An earlier flood (37,030 +8,000/-5,000 B.P.) is associated with a high terrace of early Wisconsin age.

144

Milliken, M.D., EVIDENCE FOR TWO LATE WISCONSIN TILLS AND A HIGH LEVEL EARLY WISCONSIN STAND OF GLACIAL LAKE COLUMBIA NEAR GRAND COULEE DAM, WASHINGTON
Eastern Washington University

Two tills occurring in terminal moraines are very closely related in age and areal extent. The older moraine, probably of early Pinedale age, exhibits a slightly more subdued crest, few boulders on the surface, and a locally diagnostic sagebrush cover. The younger moraine, probably of mid-Pinedale age, exhibits very sharp crests, steeper slopes, numerous boulders on the surface, and is covered primarily with cheatgrass.

A shoreline of Glacial Lake Columbia at the 806 m (2500 ft) elevation pre-dates the late Wisconsin tills. The shoreline is represented by a wave-cut bench excavated into loess which in some places exceeds 19 m (60 ft) in thickness.

Morphologic features of the shoreline are very subdued and its extent is unknown. It is highly dessicated, much more so than the younger late Wisconsin shorelines at lower elevations.

145

MAIN SIDE DRAINAGE CHANNEL OF NE OLYMPIC MTS. IN ULTIMATE GLACIATION;PENULTIMATE GLACIATION ELEVATION.

Roderick T. Roscoe
13328-30th Ave. NE, Seattle WA 98125

Juan de Fuca glacier against scarp of Elwha valley(= v.) mouth dammed drainage to W below 3000 feet elevation (= fe.). Divergence of mountain front (= mf.) from glacier margin E of Elwha v. and lowering of ice thru wind gaps in foothills allowed drainage to E of Elwha v.; S along W side Puget Sound glacier; to sea out Chehalis R. This course, detailed (traced by beaches, erratics): Elwha v. (not proved (= np)), Little v., mf., Maiden v., mf., Slab Camp pass, Gray Wolf v. (np), Dungeness v., gap SE of Bear Mt. (most prominent beaches all 2510 fe. ± 30 fe.), mf. 2400 fe., Little Quilcene v., Walker Pass 730 fe., E ridge Mt. Jupiter spillway pass 1140 fe. Penultimate glaciation landscape intact: 2900 fe. Bon Jon Pass, 4900 fe. Little R. Divide; ice apparently overtopped peaks to 6300 fe.!

146

LONG, William A.
Geologist

GLACIATION OF THE VULCAN LAKE AREA, KALMIOPSIS WILDERNESS, OREGON

In the Vulcan Lake area on the upper Chetco River drainage 20 air miles east of Brookings, Oregon, well preserved morainal deposits record three Wisconsin glacial advances. During the three advances, the first of which exceeded the later two, glacier lengths and lower limits respectively were 2 1/4, 1 3/4 and 3/4 miles, and 2400, 2800 and 3200 feet.

In the glaciated areas, surficial deposits consist mainly of Josephine Peridotite, a harzburgite-dunite tectonite that is at least 50 percent serpentinized and cut by numerous zones of sheared serpentinite. Exposures reveal layers of loose boulder till 3-10 feet thick, separated by compact clay-silt rich serpentine debris layers up to 25 feet thick. The compact layers probably are debris flows associated with glacier outburst floods from glaciers that lay on peridotite terrane.

147

Brown, R.E.

THE ORIGIN AND SIGNIFICANCE OF SEVERAL HIGH-YIELD AQUIFERS IN THE COLUMBIA RIVER BASALT

High yields of ground waters in parts of the Pasco Basin are from narrow, linear breccia zones in basalts. They evidently formed where basalt flows of appropriate temperatures and viscosities encountered streams. They include one zone in the Umatilla basalt flow, one in a Frenchman Springs basalt flow, and probably others, inadequately explored in the Pomona, Priest Rapids and elsewhere in the Umatilla and Frenchman Springs flows. More breccia zones are expected above the Vantage sandstone, first evidence of a master stream in the region. Older flows also may contain similar aquifers though different environments then prevailed. Close attention to the stratigraphic units and rock types is more imoortant than ever.

148

Reiswig, K. N.[1] and L. H. Fisk[2]
[1]Western Washington University
[2]Michigan State University

COMPARATIVE STUDY OF THE OLIGOCENE BRIDGE CREEK PALYNOFLORA AND THAT OF A MODERN COAST REDWOOD FOREST.

Chaney in 1924 and 1925 quantitatively studied leaf megafossils found in the Oligocene Bridge Creek Shale and compared them with leaves deposited in a recent stream flowing through a modern coast redwood forest. From the comparison, Chaney concluded that the Bridge Creek Flora is much like that of the coastal redwood forest found today in Muir Woods National Monument. In This investigation we studied the Bridge Creek palynoflora and compared it with the modern pollen and spore flora from Muir Woods National Monument. We also compared our results to Chaney's studies to provide an independent check on Chaney's paleoenvironmental conclusions. The palynoflora of this study correlated closely with the studies Chaney did on the megafossils.

149

Holmes, Kenneth L.
Oregon College of Education

MOUNT ST. HELENS' VOLCANIC ACTIVITY DURING THE 1800's AN UPDATE

In 1955 the author published a paper on "Mount St. Helens' Recent Eruptions" in the Oregon Historical Quarterly. Today's paper is an update of that article with added evidence from written records and from paintings and drawings done on the spot. The volcano was active intermittently during the first half of the 19th century, the last-reported eruption having been in 1857.

150

Cartwright, D. & M. Heikkinen.

DEVELOPING CONSERVATION ATTITUDES & ENERGY CONCEPTS IN INDIVIDUALS OF VARIOUS COGNITIVE LEVELS USING THE ENERGY ENVIRONMENT SIMULATOR. U of I

Computer assisted simulations are increasingly available in public school classrooms. The Energy Environment Simulator provides participants with concrete experiences in dealing with abstract real-world problems in an interactive context.
Developmental theory suggests that students at lower levels of cognitive development need concrete experiences to aquire abstract ideas. In this study college student's were randomly assigned to treatments (simulation lecture, control) that presented a variety of energy related concepts and issues. Subject's attitudes and knowledge of energy concepts were assessed. Analysis of scores was based on levels of cognitive development, treatment and the interaction.

151

Smith, John P. SCIENCE EDUCATION IN THE PEOPLE'S REPUBLIC OF CHINA
College of Education, University of Wash.

Information will be provided on the structure of primary and secondary education in the PRC with particular emphasis on science instruction. Non-regular science education efforts will also be described, e.g., popular science reading books, spare-time education, and science related radio broadcasts. Slide photographs taken in China by the author will feature schools, daily life, and historical sites.

152

Hall, J.F. SOME IMPLICATIONS OF MODERN PHYSICS FOR SCIENCE EDUCATORS
University of Victoria

In spite of the authority of Einstein and others, modern physics is usually limited to a skimpy back chapter in science textbooks and is little related to instruction, or apparently even to reality. This anomaly would seem to be a result of the wide acceptance, on the part of most science teachers, of a strictly mechanistic or atomistic concept of the universe. Yet, as a new paradigm emerges in science, can science educators continue to ignore new concepts of space, time, matter, causality, and even reality itself?

153

Stronck, D. R. THE EFFECTIVENESS OF A TEACHERS' RESOURCE KIT ON PREPARING ELEMENTARY-SCHOOL STUDENTS FOR A FIELD TRIP University of Victoria, B. C.

The Chief Naturalist of Goldstream Provincial Park near Victoria, B. C., prepared a resource kit to assist teachers in preparing their elementary-school students for a field trip to the Park during the season of salmon spawning. Before the trip, 799 students of grades 3 through 7 completed an exam on facts about salmon; the 436 students prepared by the kit had significantly higher scores. Similarly after the field trip, 623 students completed an examination on observations which could be made at the Park. The 302 students prepared by the kit had significantly higher scores. There were no differences in attitudes expressed on questionnaires.

154

Sneva, F.[1], J. Young[1], R. Evans[1], H. Mayland[1], J. Buckhouse[2], C. Britton[2], M. Vavra[2]. ST. HELENS ASH: RANGELAND IMPACTS.
1/ SEA-AR, USDA and 2/ Rangeland Resources, OSU

Ash from Yakima, Moses Lake and Moscow was transported to the Squaw Butte Station, in eastern Oregon 10-20 days after the May 18 eruption.

Chemical differences of ash among locations were small but proportions of silt increased in the more easterly locations. Chemical analysis suggest no strong fertilizer nor strong toxicity impacts. Ash decreased germination of crested wheatgrass and of cheatgrass with emergence particularly impaired by ash depths exceeding 1.2 cm. Water infiltration into a range soil was enhanced by the Yakima ash but impaired by the Moses Lake ash with sediments in the runoff highest from the latter. Ash had minimal influence on in vitro forage digestion.

155

Swanson, F.J.,B.P. Wicherski, and R.D.Smith. Erosion of 1980 Deposits of Mt. St. Helen's. USDA Forest Service and Oregon State University

Rills, gullies, and surface process have extensively eroded air fall and blast deposits from the 1980 eruptions of Mt. St.Helens. Using repeat measurement of heights of erosion pins and cross-sectional area of rills and gullies, we have measured these processes at four sites of paired down timber and clearcut areas northeast of the mountain. In this area, coarse pumice deposits up to 30cm thick overlie blast deposits of sand and fine gravel. The cutting of rills and small gullies has been the dominant erosion process. Erosion in areas clearcut before the eruptions is greater than in adjacent areas of down timber where logs and root wads are more effective in trapping transported material and interrupting the flow of water downslope.

156

Klock, G. O. EFFECTS ON THE FOREST FLOOR OF MOUNT ST. HELENS' 1980 TEPHRA DEPOSITS
USDA Forest Service, PNW Forest & Range Experiment Station, Portland, OR 97208

Tephra deposits of the Mount St. Helens' May 18, 1980, eruption were sampled from near 0 to 600 km east of the volcano. Samples were examined to determine possible effects of the new tephra on forest floor dynamics. Significant changes with distance from the volcano in the physical properties of tephra were observed. There appear to be rather small changes in the tephra properties that might affect chemical composition of the forest floor. Although the coarse particle size, high bulk densities, low plant nutrient content, and depth of the tephra from 0 to 30 km will have a marked influence on the forest floor dynamics, no appreciable effect is expected beyond 30 km to the east.

157

Erickson, H. E. and R. L. Edmonds. EFFECTS OF MT. ST. HELENS ASH ON NEEDLE LITTER DECOMPOSITION AND SOIL AND FOREST FLOOR MICROBIAL ACTIVITY. College of Forest Resources, University of Washington.

The influence of Mt. St. Helens ash on forest floor and soil microbial activity and litter decomposition rates was investigated. Two study areas were located in the Pacific silver zone; 10 km (ash depth 20 cm) and 29 km from the mountain (ash depth 5 cm). Needle litterbags (2mm mesh) were placed on the ash surface, beneath the ash and on the forest floor in cleared areas on 6 November 1980. Litter temperatures were warmer under the ash while the forest floor was drier. Microbial activity was reduced under the ash. A second study was initiated in the Cedar River Watershed 50 km E. of Seattle in a 45-year-old Douglas-fir forest. Ash was transported to the site and placed 5 and 20 cm deep on 4m x 4m plots. A control plot was also included. Litterbags were placed in each treatment as described above on 4 December 1980. Again litter temperatures were warmer and litter drier under the ash. Microbial activity (using ATP) was also found to be reduced under the ash.

158

Cole, D. W. and R. Gonyea. INITIAL EFFECT OF MT. ST. HELENS ASH ON THE CHEMISTRY OF SOIL LEACHATES. College of Forest Resources, University of Washington.

Ash from the 18 May 1980 eruption of Mt. St. Helens was applied at 5 and 20 cm depths to a gravelly outwash forest soil at the Thompson Research area, Cedar River Watershed. Soil leachates were collected at four-week intervals at the 10 and 50 cm soil depths. Initial results clearly indicate a marked increase in the ionic concentration of these soil solutions, especially those collected at the 10 cm soil depth. The principal anion released from the ash effecting this leaching process is cloride. Four months following the application of ash, leachate concentrations have returned to nearly that of the control area.

159

Harr, R.D. FOG DRIP IN THE BULL RUN MUNICIPAL WATERSHED, OREGON. USDA Forest Service, Pacific Northwest Forest & Range Experiment Station, Corvallis, Oregon 97331

Net precipitation under old-growth Douglas-fir forest in Oregon's Bull Run Watershed totaled 1 747 mm during a 40-week period, 419 mm more than in adjacent clearcut areas. Expressing data on a full water year basis and adjusting for rainfall interception suggests fog drip added 715-890 mm to total precipitation during a year when a standard raingage in the open collected 2 160 mm of precipitation.

160

Water quality after timber harvesting, one site in the Bull Run Municipal Watershed, Oregon. R. L.Fredriksen,USFS,PNW For.& Range Exp. Sta. Corvallis, Oregon.

The result of road construction,clearcutting 1/4 of two watersheds and reduction of slash by broadcast burning one and natural decomposition on the other was 1) increased suspended sediment concentrations of 0.4-0.5 mg/l, 2) maximum temperature increases of 2-4 C°, 3) NO_3-N concentrations to .08 and .27 mg/l and no change in the P, organic N, cations, silica and total dissolved solids concentrations. These changes in water quality are the least damaging to downstream values reported in the Pacific Northwest and are the result of stable bedrock,low relief and a phosphorus limited system.

161

Carr, W. W. and C. J. Marchant EROSION CONTROL IN THE QUEEN CHARLOTTE ISLANDS
University of British Columbia

Soil erosion resulting from forest harvesting activities on the Queen Charlotte Islands gained national prominence in August 1979 with a conflict between Federal Fisheries and the B.C. Ministry of Forests. Sediment from forest roads and from slope failures following harvesting was having an adverse effect on extremely productive salmonid spawning areas.
In 1978, the Ministry of Forests had begun an investigation into the use of vegetation for controlling erosion in the Queen Charlottes, as well as enhancing slope stability. An innovative helicopter-hydroseeding system and a native shrub propagation program are included in the study.

162

Klock, G. O. WILDERNESS WASTE MANAGEMENT AND WATER QUALITY IN THE ENCHANTMENT BASIN USDA Forest Service, PNW Forest & Range Experiment Station, Portland, OR 97208

Levels of the indicator bacteria fecal coliform and streptococci were measured periodically from June through October 1979 and 1980 in the waters of the Snow Creek watershed, Alpine Lakes Wilderness Area, Washington. The objective was to determine the effectiveness of the present human waste management method in protecting water quality within a high use wilderness recreation area. Laboratory analyses indicate that this method is assisting in maintaining zero to extremely low indicator bacteria levels in waters of the study area.

163

Larson,D.W.,and M.E.Forbes. LIMNOLOGICAL RESEARCH AT CRATER LAKE,OREGON:HISTORICAL PERSPECTIVE.

Corps of Engineers and National Park Service

Crater Lake,Oregon,occupies the collapse caldera of volcanic Mt.Mazama.The lake remains pristine by virtue of its status as a National Park.Limnological characteristics are unusual:maximum depth is 589m (seventh deepest in the world),the photic zone extends to 100m,and the phytoplankton maximum occurs between depths of 80 and 120m,although small centric diatoms abound at 200m.

The lake has been studied infrequently.Depth soundings were made in the 1880's,followed by limnological investigations in 1913,1937,1940,1958, 1967-69 and 1978-80.The most recent study,largely a privately funded endeavor,continues research started in 1967.

164

Bulson, P. and D. L. Johnstone IMPACT OF ALUM TREATMENT OF LIBERTY LAKE ON COLIFORMS AND STREPTOCOCCI. Washington State University

Bacteriological analyses were performed on Liberty Lake before, during and after treatment with aluminum sulphate (for phosphorus removal) to determine the affect on the exogenous bacterial population. Tests included were total coliform, fecal coliform, and fecal streptococci. Bacterial numbers decreased with suspended solids and another observable correlation exists between bacterial number and secchi disk. Within hours of the treatment as much as 100% fecal bacteria were removed.

165

Patrouch, J.C. WASTE TREATMENT IN AN ALGAE-ZOOPLANKTON AQUACULTURE SYSTEM
Washington State University

A two stage, lab-scale, continuous flow, tertiary treatment aquaculture system was developed to determine the relationship between phosphorous loading rate, detention time, nutrient removal, algae production, and zooplankton harvest rates. Nitrogen removals were in excess of 90%, orthophosphorus removals average 50%. The daily harvest rate of 22% represents a potentially marketable end product. Effluent BOD and suspended solids were well within the national standards. Tentative design parameters were established.

166

Wilbur, J. S. CHANGES IN THE WATER TABLE AND GROUND-WATER MOVEMENT AT THE HANFORD SITE 1944-1980 BATTELLE, PACIFIC NORTHWEST LAB

Many variations in the ground water have occurred at the Hanford Site in the past 36 years. In the first 12 years of operation, the water table was raised 80 feet in some areas. This was the result of the disposal of 28 billion gallons of process water. At a distance of 20 miles from the disposal site, the water table was raised a foot. This information gave transmissivities of 4,000 ft^2/d to 400,000 ft^2/d. With 132 billion gallons of water disposed of in the past 24 years, new transmissivities of 1,300 ft^2/d to 310,000 ft^2/d were found.

167

Routson, R. C., Barney, G. S., Smith, R. M., and Delegard, C. SORPTION OF TRACE Cs ON 21 HANFORD SITE SEDIMENT TYPES Rockwell Hanford Operations

Sorption of ^{137}Cs was measured on 21 Hanford Site Sediment Types. A Box-Behnken statistical design was used to develop empirical - statistical equations predicting ^{137}Cs sorption as a function of the equilibrium concentrations of macroions Na, K, and Ca in solution over the concentration ranges of 3.0 - 0.001M, 0.2 - 0.002M, and 0.2 - 0.002M, respectively. These equations are required to estimate ^{137}Cs transport from Hanford Site ground disposal sites. Average sorption equations for the 21 sediments will be presented and discussed.

168

Kabir, J. WATER JET FOR RESTORATION OF SPAWNING GROUND
College of Engineering, Washington State U.

The valuable Salmon fishing industry in the Pacific Northwest is declining due to the loss of spawning ground caused by sedimentaion at the streambeds. Average egg-to-fry survival rate is 10 percent in silted gravel while survival in clean gravel is nearly 80 percent. The silted spawning gravel in the natural streams can be cleaned by using high velocity water jets to flush out the fine silt from the gravel and remove them for out-of-stream disposal. This paper presents a model to predict the cleaning action of the impinging water jets on nonuniform streambed.

169

Otchere-Boateng, J. and T.M. Ballard. NITRIFICATION IN SOME FOREST FLOOR AND MINERAL SOIL SAMPLES. Dept. of Soil Science and Faculty of Forestry, U.B.C.

Laboratory incubation study showed that nitrification was greater in untreated soils from the most productive (N-rich) sites (e.g. conifer-alder sites) and soils with a one-year history of urea fertilization than in the samples from unfertilized, less productive sites. Nitrification correlated well and directly with total N and inversely with C/N ratio of the samples. At 5°C, nitrate production in the poor-site samples (treated and untreated) was limited throughout the study. The N-rich samples produced some nitrate at this low temperature later in the study period. All urea-treated samples were able to undergo some nitrification at 22°C by the end of 145 days, though nitrification occurred earlier in the fertilized or N-rich samples.

170

Van Miegroet, H. THE INFLUENCE OF RED ALDER AND DOUGLAS-FIR ON SOIL NITRIFICATION CAPACITY AND NITRATE LEACHING. University of Washington.

Nitrate leaching was followed in red alder and Douglas-fir ecosystems which have developed from the same soil series. Rates of nitrate production differed substantially between the forest types. Although seasonal changes in nitrification were observed in the red alder soil, nitrate concentrations were consistently > 5ppm throughout the year. No significant nitrification and nitrate leaching was observed in the Douglas-fir ecosystem.
In a second independent study these soils were tested for their nitrification capacity using an aerobic incubation procedure. Again it was noted that rapid nitrification occured in the red alder soil, whereas little nitrate production could be detected in the Douglas-fir soil.
It is suggested from these experiments that soil nitrogen content is the major factor controlling the nitrification capacity.

171

Hart, G.E. and N.V. DeByle. SLASH DISPOSAL AND SOIL SOLUTION CHEMISTRY IN LODGEPOLE PINE CLEARCUTS. Utah State University

Only slight increases in cations were found in soil solutions under near-complete residue disposal treatments (bare and chip-mulch) and conventional treatments (broadcast and windrow burning) compared with an undisturbed lodgepole pine stand in western Wyoming. Maximum post-treatment annual averages were 2,2,3, and 12 mg/ℓ for sodium, potassium, magnesium and calcium, respectively. No change in streamwater quality for these elements would be expected. Nitrate-nitrogen levels in soil solution increased considerably under all treatments, particularly beneath burned windrows where concentrations approached 10 mg/ℓ. Limited sampling of total phenols showed an occasionally high level, over 1 mg/ℓ, where chip mulch was used. Residue treatments which cause minimum surface disturbance, such as broadcast burning, are recommended. Chip mulching and intense burning are not recommended in areas where soil water drains directly into stream channels without dilution.

172

Green, R.N. and R.L. Trowbridge 1981. AN OUTLINE OF THE PROPOSED TAXONOMIC CLASSIFICATION OF HUMUS FORMS IN ECOSYSTEMS OF B.C. Province of B.C., Ministry of Forests

The first approximation of a taxonomic classification of humus forms is presented for testing. The significance of humus forms to forest management and rationale for the proposal are discussed. The terms humus, humus form, humus form profile and humus form control section are defined. Definitions and designations of master and subordinate horizons used in the classification are provided. Categories and nomenclature of the proposed taxonomic system are explained and a synopsis of taxa, along with examples of taxonomic keys, humus form profile diagrams and morphological descriptions is presented. The methodology for describing, sampling and analysing humus forms is briefly described.

173

Girolomon, G.C. and D.L. Johnstone MIGRATION AND TRANSFORMATION OF NITROGEN COMPOUNDS IN HIGHLY PERMEABLE SOILS. Washington State University

Recently, several wells within the Rock Island, Washington area have had nitrate nitrogen concentrations in excess of established standards. A possible source of this contamination is from the septic tank and leaching field system employed by the majority of the residents within the community.

The Malaga series is the predominate soil of the area with substration of poorly sorted, stratified coarse sands, gravels and cobbles. This material has a rate greater than 20 inches per hour.

A daily application of an inorganic nitrogen and soluble carbon solution was applied to columns filled with this substration material from the Rock Island area. Results of the interaction of inorganic nitrogen with organic carbon and the movement of nitrogen and carbon through this material will be discussed.

174

Pratt, J.R. Seasonal variation in protozoan communities inhabiting artificial substrates in a scabland pond. Eastern Washington Univ., Cheney, WA 99004

Seasonal differences in protozoa colonizing polyurethane foam substrates near the surface and on the bottom of a 1m deep pond were not apparent. Substrates were colonized for six weeks prior to collection. Top and bottom substrates were collected weekly from August through March. Water quality parameters were determined. Numbers of species and overlap between successive samples were relatively constant. Species overlap decreased at times of heavy rainfall and ice melt. Numbers of flagellate species were nearly constant while sarcodines and ciliates varied. Species of ciliates declined during Daphnia blooms and following rainfall and ice melt. Species overlap of samples increased rapidly following perturbation. Substrate communities are indicative of recent perturbation in aquatic environments.

175

Pernsteiner, C.A. and N.V. Vigfusson. SISTER CHROMATID EXCHANGE AS AN INDICATOR OF SHORT-TERM CHEMICAL STRESS IN AQUATIC SYSTEMS. Dept. of Bio.,EWU, Cheney WA, 99004.

This study was designed to demonstrate the use of sister chromatid exchange (SCE) as a means of assaying, in vivo, the presence of mutagenic/carcinogenic substances in aquatic systems. The central mudminnow (Umbra limi) was exposed to various concentrations of Endrin, Chlordane (chlorinated hydrocarbons), Guthion and Diazinon (organophosphates), and 2 known mutagens (mitomycin C and ethylmethane sulphonate), followed by in vivo determination of SCE frequencies. Endrin and Chlordane induced substantial increases in SCE frequency while Diazinon and Guthion did not. Results indicated the potential of SCE techniques as a bioassay for determining the presence of DNA damaging pollutants in natural waters.

176

Hansen, L.A. and R.J. White QUANTITATION OF SEX-SKIN SWELLING IN RESPONSE TO ESTRADIOL-17 BETA TREATMENT IN MACACA NEMESTRINA Eastern Washington University

The sex-skin of the pigtail monkey swells and detumesces in response to hormonal changes during the menstrual cycle. This study was designed to discover the best external indication of ovulation.

In four separate experiments, two ovariectomized pigtail monkeys were treated with estradiol-17 beta (E_2) and progesterone to duplicate cyclic sex-skin changes.

Photographs and six linear measurements of the sex-skins were taken and color changes were monitored using Munsell color chips. Blood was drawn every 48 hours, and serum levels of E_2 were determined by RIA. All measurements were graphed and correlation coefficients between the variables were determined. The best correlations with swelling (volume) were measurements of a 2.3 cm tattooed circle (96, 91.5) and the total sex-skin width (95.5, 87.5) for the two animals studied.

177

Beach, R.J., and R.D. Everitt. Marine Mammals and Washington's Gillnet Fishery.
Washington Department of Game

The Washington Game Department is investigating marine mammal/fishery interactions on the Columbia River and adjacent waters. Damage to gillnetted salmonids was greatest in Grays Harbor (25% to 30% of the catch) and least in the early fall Columbia River season (1.4%). Damage to fish caught in Willapa Bay (7% to 10%) and the winter Columbia River season (7%) were considered high. Damage rates appear to correlate with seasonal abundance of harbor seals in local areas. Incidental take of marine mammals was greatest in Willapa Bay. A take of 325 marine mammals (primarily harbor seals) was recorded in our sample for all fisheries, which included at least 32 animals killed. Maximum numbers of harbor seals taken from aerial surveys in the late summer exceeded 4,500 animals. Northern sea lions numbered 264 animals in June and California sea lions numbered 75 in May.

178

Petersen, D.J. BREEDING BEHAVIOR OF THE WESTERN WINTER WREN (TROGLODYTES TROGLODYTES PACIFICUS). Western Washington University

The breeding behavior of a lowland population of winter wrens in Whatcom County, northwest Washington, was observed in the spring and summer of 1980. Investigations included territorial defense, song behavior, male-female interactions, nest building, predation, incubation, and parental care of young.

Agonistic response to intruders declined rapidly early in the pre-nesting period. Interspecific aggression toward sympatric Bewick's wrens and black-capped chickadees was low at all times. Prominent, exposed understory song perches were preferred. Nest site selection was highly variable. Predation was high on nests under observation. The female incubates alone; both parents, but primarily the female, feed the young.

179

Huff,Mark H. FIRE AND BIRD COMMUNITIES IN OLYMPIC NATIONAL PARK, WASHINGTON

NPS Coop. Park Studies Unit, Univ. Washington

Fire, a disturbance factor which can influence the composition of both plant and animal communities, is being examined in the lush west-slope forests of the Olympic Mountains. Breeding bird populations in Tsuga heterophylla-Pseudotsuga menziesii forests on four postfire sites: 1978 Hoh, 1961 Queets, ca 1802 Mineral Creek, and ca 1500 Olympus Guard Fires and further field work will be discussed.

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- if you grind it up small enough you will not be able to distinguish between mountain lion and DF"
- 1/3 of world is sufficiently covered with water .'. large majority of species developed which can withstand drought or go into dormant kind of dormancy fire also plays an important role:
- Mention of professional disease -
- fire usually removes small and not the big.
- Spirits end of the top of layer-cake quickly as pioneer species.

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